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PHYCOLOGIA AUSTRALICA;

OR,

A History of Australian Seaweeds;

COMPRISING

COLOURED FIGURES AND DESCRIPTIONS

OF THE MORE CHARACTERISTIC

MARINE ALGÆ OF NEW SOUTH WALES, VICTORIA, TASMANIA,
SOUTH AUSTRALIA, AND WESTERN AUSTRALIA,

AND

A SYNOPSIS OF ALL KNOWN AUSTRALIAN ALGÆ.

VOL. I.,

CONTAINING PLATES I.–LX.

BY

WILLIAM HENRY HARVEY, M.D., F.R.S.,

MEMBER OF THE ROYAL IRISH ACADEMY, FELLOW OF THE LINNÆAN SOCIETY, COR. MEM. OF THE
ROYAL ACADEMIES OF UPSAL AND MUNICH; OF THE IMP. ACAD. LEOP. CÆSAR. NAT. CURIOSORUM;
HON. MEM. OF THE LYCEUM OF NAT. HIST., NEW YORK, ETC. ETC. ETC.,

AND

PROFESSOR OF BOTANY IN THE UNIVERSITY OF DUBLIN.

24

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TO

GEORGE CLIFTON, ESQ., R.N.,

OF

FREMANTLE, WESTERN AUSTRALIA,

AN ACUTE OBSERVER AND SUCCESSFUL COLLECTOR OF ALGÆ,

The First Volume of the 'Phycologia Australica'

IS INSCRIBED,

IN PLEASANT MEMORY OF OUR BOATING AND DREDGING EXCURSIONS,

AND AS A GRATEFUL ACKNOWLEDGMENT

FOR LIBERAL SUPPLIES OF WELL-SELECTED SPECIMENS,

BY

HIS FRIEND AND FELLOW-STUDENT,

THE AUTHOR.

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(The Synonyms are printed in *italics*.)

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ADVERTISEMENT.

In the year 1853 the Author undertook a botanical voyage to the Australian Colonies, with the sanction and under the auspices of the University of Dublin and of the Royal Dublin Society, both which corporate bodies contributed to his outfit, and, in great measure, supplied the funds on which he travelled. He visited in succession the Colonies of Western Australia, Victoria, Tasmania, and New South Wales; and in the eighteen months which he spent on the Australian shores, collected, prepared, and dried upwards of 20,000 specimens of 600 species of Algæ, besides incidentally making collections of marine zoology to a considerable extent, and drying land plants wherever he had the opportunity. Full sets of his collections have been placed in the University Museum and Herbarium; a set of the botanical collections, nearly as full, has been sent to the Hookerian Herbarium at Kew; and the duplicate Algæ that remained over have been sold towards a payment of the expenses of the journey.

The duplicates having thus been widely scattered, it has appeared to the Author that a work illustrating these dispersed collections would be acceptable to those who possess them, and might be made subservient to a wider purpose, that of promoting the study of Marine Botany in our Australian dependencies. In England, the publication of serial works, accompanied by plates or woodcuts, and confined to separate branches either of Zoology or of Botany, has been found greatly to promote the study of Natural History in general. The student who commences with one branch, when he has in some degree mastered it, is led on to another; and thus one who begins by picking up a few shells or seaweeds on occasional visits to the shore, often ends in becoming an expert naturalist. The Author is gratified by knowing that his 'PHYCOLOGIA BRITANNICA' has obtained a considerable circulation among amateur collectors of marine plants, and, he trusts, has been useful in leading many persons to observe and study some of the most beautiful and delicate of Nature's vegetable productions. In now commencing a 'PHYCOLOGIA AUSTRALICA,' though he cannot look for so large an audience, at least at the outset, yet he hopes this work may win some favour from the Colonial public, for whose use it is more especially designed. Great cities are springing up in the Australian Colonies; and watering-places, to which the citizen takes his family to enjoy the sea-breeze during the summer-time, are coming into being. English tastes and habits are reproduced at the antipodes; and among these a love of Natural History may be prominently reckoned. Our fellow-countrymen, wherever they go, bring or send home specimens of natural objects, and there is, perhaps, no country where collections of botanical and zoological specimens are more widely dispersed than in England among the population. Already in Australia there are many intelligent collectors of Algæ, and all that seems wanting to induce many more to pursue this pleasing branch of botany, is some book, in which they will find an intelligible account of these plants, and of their classification. The Author's 'NEREIS AUSTRALIS' was too exclusively addressed to expert botanists already familiar with the technical language of the science, and even if completed on its original plan, would not serve as a guide to amateur collectors.

The present work, it is hoped, will serve the purpose both of the expert botanist and of the amateur. The former will find a technical description of each plant; and the latter will have presented to his or her eye a coloured drawing, accompanied when necessary with such magnified dissections as will enable any one possessed of a microscope to refer with certainty the figure before him to the plant which it represents. Unfortunately—as some may think—for the amateur, the classification of Algæ is based on characters which it often requires a microscopic examination to ascertain. This presents a difficulty at the outset, which is only gradually overcome as the student's knowledge of types of form becomes extended. After all, however, the generic types are not very numerous, and when once known, are easily remembered and discriminated.

The number of species of Algæ dispersed along the Australian coasts may perhaps be estimated at nearly 1000: the number actually known is about 800. To figure each of these, on a separate plate, would too greatly enhance the price of the work, and place it beyond the reach of an ordinary purchaser. It is therefore proposed to limit the number of Plates to 300, and to select, from the ample materials supplied by the Dublin University Herbarium, such forms as are most characteristic of the Australian Marine Flora, care being taken to figure at least one species of every genus. Figures of many Australian Algæ have already been given in the Author's 'NEREIS AUSTRALIS,' and in the 'FLORA NOVÆ-ZELANDIÆ' and 'FLORA TASMANIÆ' of his friend Dr. Hooker. As a general rule, species figured in these works will not be repeated; but exceptions will be made in favour of some characteristic types of form which cannot be omitted without injury to the scope of the present work.

It may be well to give, in this place, for the use of young collectors, a few plain directions for the collecting and preserving of Marine Algæ.

Algæ are to be sought either in their place of growth, on the rocks and in the rock-pools left bare or accessible at the fall of the tide; or in the *rejectamenta* thrown up by the waves on sandy beaches, or among drifting masses of weed and tangle that sometimes accumulate between two strong currents; or the deep-water species may often be procured by the use of a dredge. The collector should have a basket to bring home the firmer kinds, and a few wide-mouthed (*pickle*) bottles for the more delicate and gelatinous; for these latter should not be exposed to the air, and if possible should be kept cool and in salt water. Where a boat is used, the ordinary ship's-buckets, filled with salt-water, make excellent collecting utensils. When brought home, if the number of specimens be large, they should be assorted into two classes; one containing those which are of firm consistence, the other the membranous and filamentous kinds. The former may be set aside, in tubs or basins of *fresh*-water, to steep for some hours previous to being dried. The latter must be kept, not too much crowded, in vessels of *salt*-water, and only plunged for a few seconds or minutes (according to the nature of the plant) into fresh-water, before being placed on paper. No time must unnecessarily be lost in preparing the more delicate Algæ for drying, as many of them, if left for a few hours, even in salt-water, will completely decompose and become worthless.

The collector should be provided with two or three large flat dishes, or deep plates, to float the specimens after they have been washed and pruned, and one or two shallower plates or smaller dishes. One of the large dishes should be filled with sea-water, and in it the stock of specimens first to be prepared may be kept ready. The other two dishes are to be filled with fresh-water. A specimen, taken from the stock, is then introduced into one of the dishes of fresh-water, washed to get rid of mud, sand, or parasites, and pruned, or divided into several pieces, if the branches be too dense, or the plant too much tufted to allow of being properly displayed on paper. The washed and pruned specimens are next to be floated in the second dish, until several are ready. They are then removed, one at a time, into one of the shallow plates, which must be kept full of *clean* fresh-water. Here the specimen is floated and made to expand fully. Next, a piece of white paper of suitable size is introduced into the plate, under the expanded specimen. The paper then, with the specimen properly displayed upon it, is cautiously brought to the surface of the water, and gently and carefully drawn out, so as not to disarrange the branches of the specimen. A forceps, a porcupine's quill, or a knitting-needle, or any fine-pointed instrument, will assist the operator in displaying the branches and keeping them apart while the plant is being lifted from the water; and should any small branch become matted in removal, it may be set to rights by dropping a little water from a spoon upon it, and assisting the natural opening of the branchlets with the forceps or quill.

The specimen, as now displayed on a piece of wet white paper, is to be placed on a sheet of soaking-paper, and other specimens placed beside it, till the sheet be covered. A piece of thin calico or muslin, as large as the sheet of soaking-paper, is then spread over the wet specimens. More soaking-paper, and another layer of specimens covered with a cotton rag, are laid over the first; and thus a pile of alternate soaking-paper, specimens, and rags is gradually raised. This pile or bundle is then placed between a pair of flat boards, a weight put on it, and it is left for some hours. It must then be examined, the wet soaking-papers removed and dry ones substituted; but the cotton rags may be allowed to adhere to the face of the specimens until the latter are perfectly dry, when they will come off without trouble, even from the most gelatinous kinds. After two or three changes of soaking-papers, the specimens will be sufficiently dried, and will in most cases adhere firmly to the white papers on which they have been displayed, and are then ready for the Herbarium.

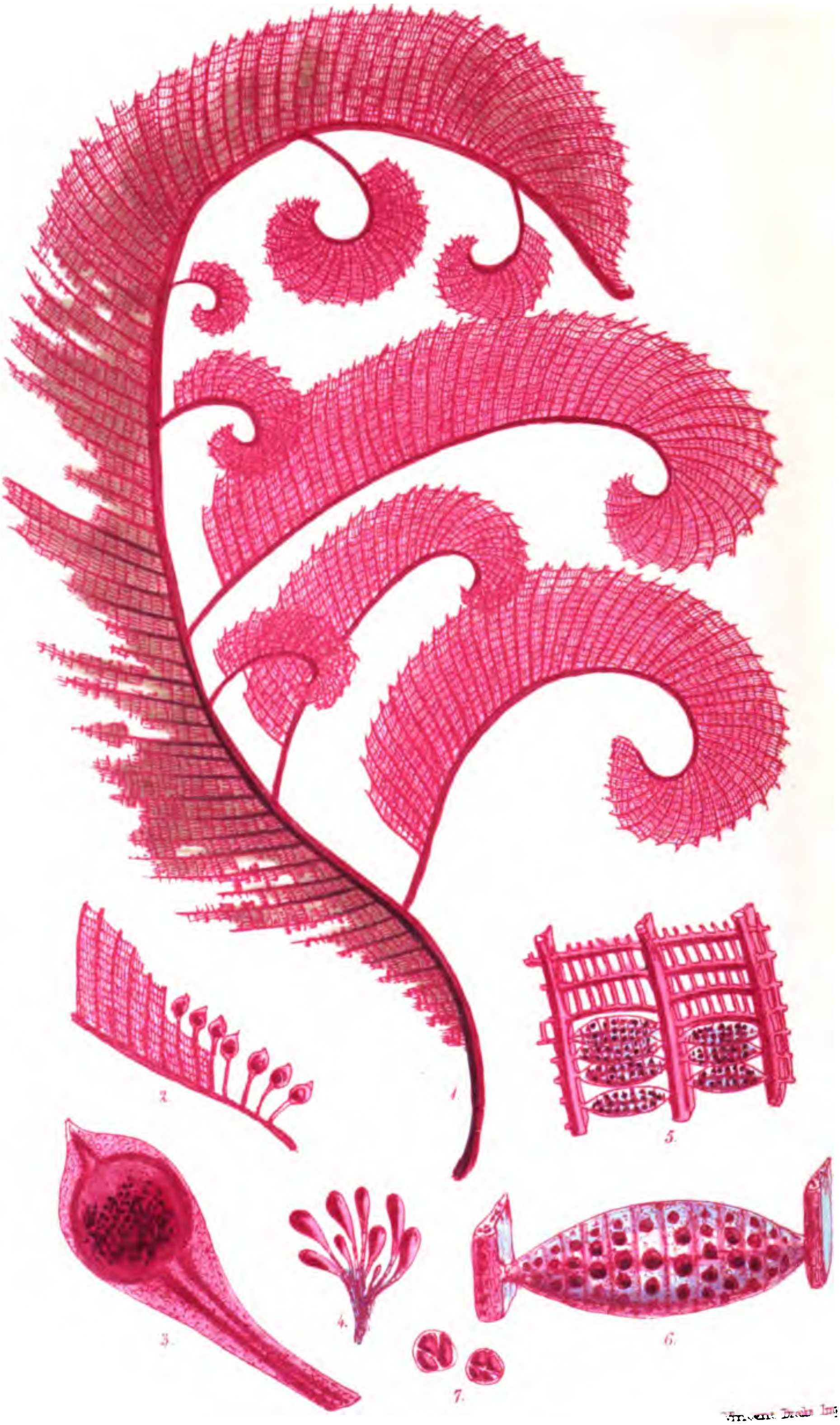
After a few trials the process, which it has taken more time to describe than it occupies in practice, will be readily learned. The great majority of the Marine Algæ are easily preserved, and make very pretty objects for an amateur collection. When once dried, if kept in a dry place, they will last for ever, and when it is desired to examine a portion of a dried specimen microscopically, a minute fragment may be moistened, and placed moist on the table of the microscope. The more translucent kinds do not require dissection; but to see the structure of the opake frond, the student must make thin longitudinal and transverse slices, and examine these. Such slices are best made under a simple lens of about 1 or 1½ inch focus, placed on a movable arm over a firm horizontal stage. The best instrument for the purpose is known to London opticians as the "simple botanical microscope." The cuttings are made with small, finely edged dissecting knives, or may be made with lancets when knives cannot be procured. The object to be cut should be tolerably dry, and about a quarter of an inch long, and is to be held firm on the stage by pressing on it the nail of the forefinger of the left hand, while the cutting is being made with the right hand, the eye being kept closely applied to the lens. If the section do not readily expand in a drop of water, a drop of muriatic acid will often assist the expansion. Some very delicate *Callithamnia* and *Polysiphoniæ* cannot be removed from paper by water; but fragments sufficient for examination, of most of these, may be loosened (with loss of colour however) by ammonia.

A collection of Algæ may be kept, either in volumes, bound with short interleaves, or in portfolios; in the latter case the species of each genus should be enclosed in a separate wrapper of stiff paper, of uniform size, the name of the genus to be written on the outside of the wrapper. Where the number of portfolios or genus-papers is large, closed cabinets with shelves, as in an ordinary Herbarium, must be provided.

Before closing this Advertisement, the Author takes this opportunity of soliciting, from collectors of Algæ resident in Australia, specimens in aid of the work. It is, he trusts, the interest of every Australian Algologist, that a work undertaken to illustrate the Algæ of Australia should be made as perfect as possible; and to make it perfect will require *well dried* specimens of as many species as can be procured. For even though all be not *figured* in our volumes, those that are omitted will be briefly described and compared with figures of species they most resemble, in a general *Synopsis* intended to be prefixed to the last volume. Collections of specimens will therefore be thankfully received and gratefully acknowledged. Nor will the advantage herein be all on the side of the Author. For, if collectors who send him specimens will *carefully* number them, and keep a duplicate set numbered to correspond with that forwarded, he will undertake to send in return *names*, according to the list of numbers. In this way the student may easily have his whole collection correctly named, provided he make no mistake in putting two different plants under one number.

Collections of specimens intended for the Author may be sent to CHARLES MOORE, Esq., Botanic Gardens, Sydney; to Dr. FERDINAND MUELLER, Botanic Gardens, Melbourne ; or to GEORGE CLIFTON, Esq., Fremantle, Western Australia. Or, if sent to England, they may be addressed to Sir W. J. HOOKER, Royal Gardens, Kew; or to the publisher, Mr. LOVELL REEVE, 5, Henrietta Street, Covent Garden, London.

Plate I.



Vincent Brooks Imp.

PLATE I.

CLAUDEA ELEGANS, *Lamour.*

GEN. CHAR. *Frond* stipitate; stipes filiform, merging in the marginal rib, of a flat, unilateral, open network, formed of several series of anastomosing, slender leaflets. *Fructification:* 1, *ceramidia,* containing, within a membranous pericarp, a tuft of pear-shaped spores; 2, *stichidia,* formed from the bars of the network, and studded with triangularly parted tetraspores, in transverse rows.—CLAUDEA (*Lamour.*), in honour of Claude Lamouroux, father to the botanist of that name.

Frons stipite donata. Stipes filiformis, mox in costam marginalem reticuli plani, fenestrati, ex foliolis minutis pluriseriatim secundis uninerviis anastomosantibus formati abiens. Fruct.: 1, *ceramidia;* 2, *stichidia inter trabeculas reticuli seriata, tetrasporas triangule divisas, transversim ordinatas foventia.*

CLAUDEA *elegans;* frond proliferously branched; branches recurved, furnished along the upper edge with a scimitar-shaped network, formed of three series of parallel, filiform leaflets; meshes of the net rectangular; margin denticulate; cystocarps inflated, pedicellate.

C. elegans; *fronde prolifera; ramis recurvis acinaciformibus hinc reticulo unilaterali ornatis; reticuli trabeculis triseriatis rectangule anastomosantibus; margine denticulato; cystocarpiis inflatis pedicellatis.*

CLAUDEA elegans, *Lamour. in An. Mus. v.* 20. *p.* 121. *t.* 8. *f.* 2. *Grev. Syn. Alg. p. xlvi. Endl. Syn. p.* 50. *Harv. in Hook. Lond. Journ. Bot. v.* 3. *p.* 408. *t.* 20. *Kütz. Sp. Alg. p.* 888. *Harv. Alg. Austr. p.* 15; *Alg. Exsic. Austr. n.* 109.

O'NEILLIA elegans, *Ag. Syst. p.* 253; *Sp. Alg. v.* 1. *p.* 170.

FUCUS Claudei, *Turn. Hist. Fuc. t.* 243.

HAB. On rocks, in 5–10 fathoms water; rarely at extreme low-water mark. On the coast of New Holland, *Péron.* In the Tamar, above Georgetown, as far up (at least) as Point Rapid, *Mr. Gunn,* and other collectors. remantle, Western Australia, *Geo. Clifton, Esq.*

GEOGR. DISTR. Not known in any other localities.

DESCR. *Root* discoid. *Fronds* tufted, 12–18 inches in length, much branched in a proliferous manner, each new branch springing irregularly from the side of an older branch. In old specimens the stipes is $\frac{1}{8}$ of an inch in diameter, terete, solid and cartilaginous or horny, and subdichotomously branched. The branches soon become filiform, and at about half an inch above their base begin to be furnished along the outer or upper side with a broadly linear open network, and on the lower or inner side with a narrow wing. The branch thus becomes a sort of marginal winged rib or rachis to a unilateral network. This net is formed of *three* series of very slender, linear, flat, midribbed leaflets; the leaflets of each series being parallel to each other, and those of each successive series issuing at right angles with those of the preceding. The leaflets of the *first* series spring directly from the primary branch (or marginal rib of the net), and each is continued into an excurrent point, or tooth, on the outer or opposite side of the network; they stand from $\frac{1}{8}$–$\frac{1}{10}$ of an inch apart, and are slightly curved upwards. The leaflets (or bars) of the *second* series rise, at intervals of $\frac{1}{20}$–$\frac{1}{30}$ of an inch, from the upper side of the midrib of those of the first series, and each anastomoses with the lower side of the midrib of the leaflet next above it; and those of the *third* series, in like manner, connect by a series of crossbars the leaflets of the second series. Those of the first and third series are therefore parallel to each other, and those of the second are at right angles to both. The interspaces between the crossbars form rectangles about thrice as long as broad. Each network, when fully grown, is 10–12 inches long and about an inch broad, and is elegantly recurved, like a scimitar; the apex minutely hooked, and the outer margin ciliato-denticulate. The structure of the leaflets is uniformly cellular; the surface-cells polygonal and flattened. The substance is delicately membranaceous; and the colour a beautiful rose-red, becoming brighter in fresh-water. The *cystocarps* (*ceramidia*) are formed in the midrib of metamorphosed primary or secondary leaflets, and in either case the metamorphosed leaf is reduced to a winged, clavate, mucronulate pedicel, near the summit of which the ceramidium is formed: this is subglobose, inflated, with a minute obliquely-placed orifice; it has membranous walls, and contains, on a basal placenta, a dense tuft of pedicellate, pyriform spores. The *stichidia* are formed out of the bars of the *second* series in the network, and are elliptic or broadly lanceolate, containing transverse rows of tetraspores.

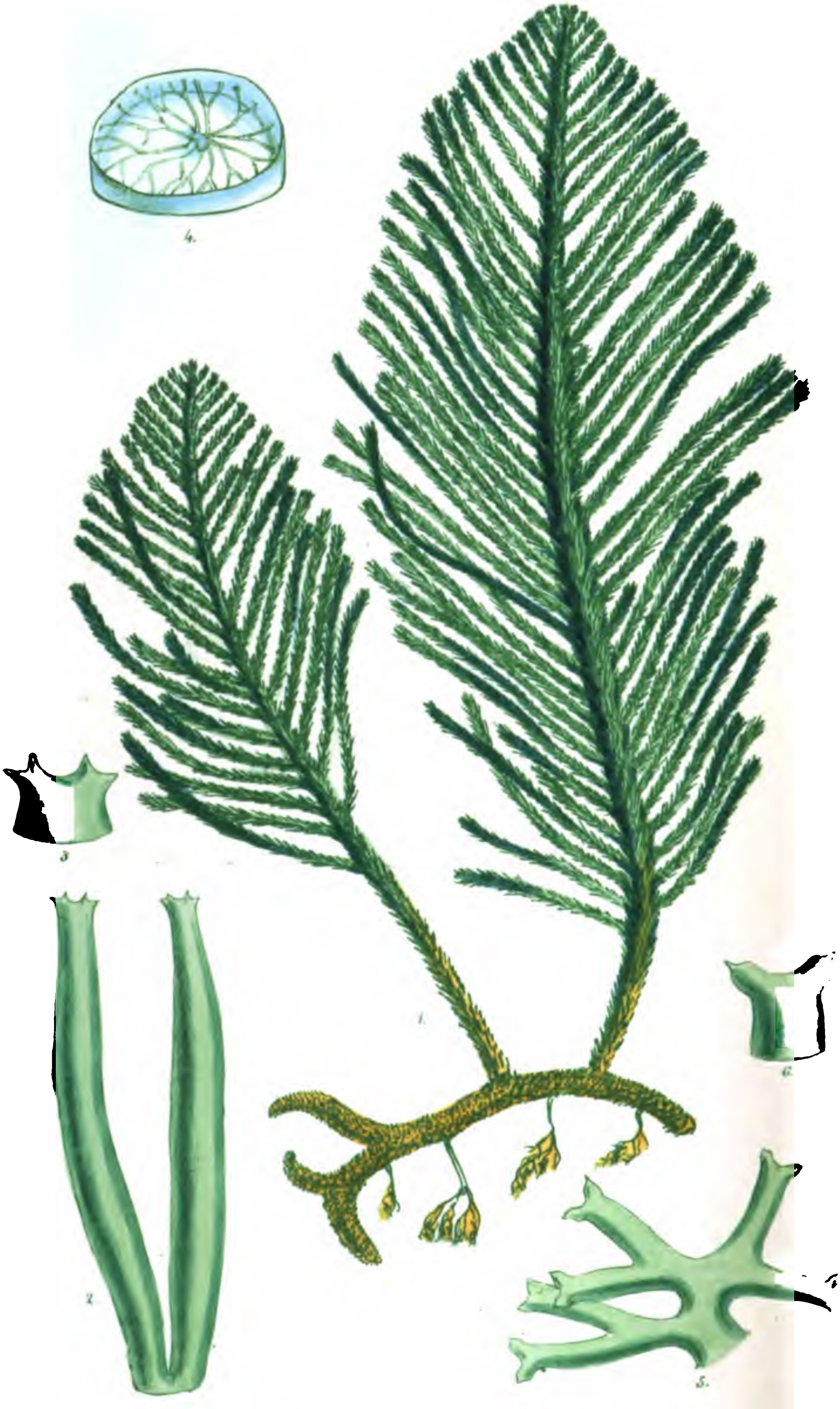
* * *

This, the most beautiful of all Algæ, though known to botanists for upwards of half a century, was scarcely to be found, except in fragments, in any herbaria previous to the year 1844, when Mr. Gunn discovered a copious habitat in Tasmania. Péron's specimens probably came from Western Australia, where this plant appears to be much rarer than in Tasmania. In the latter island its habitat is in the deep and rapid estuary of the Tamar, at a considerable distance above its mouth, and where the water, though still very salt, is not so salt as on the open coast. Hence probably arises the greater size and delicacy of the Tasmanian specimens.

A second and very distinct species of *Claudea* (*C. Bennettiana*, Harv.) is found in the Paramatta River, Port Jackson, and a third (*C. multifida*, H.), in Ceylon.

Fig. 1. CLAUDEA ELEGANS; portion of the frond,—*the natural size.* 2. A portion of a branch, bearing ceramidia,—*nat. size.* 3. A metamorphosed leaflet bearing a ceramidium. 4. Spores from the same. 5. A portion of the network, bearing stichidia. 6. Stichidium, between sections of two bars. 7. Tetraspores:—the latter figures variously *magnified.*

Plate I



Vincent Brooks lith.

Ser. CHLOROSPERMEÆ. Fam. *Siphonaceæ.*

PLATE II.

CAULERPA MUELLERI, *Sond.*

GEN. CHAR. *Frond* consisting of prostrate *surculi* rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semi-fluid, grumous matter. *Fructification* unknown.—CAULERPA (*Lamour.*), from καυλος, *a stem*, and ἑρπω, *to creep*; creeping surculi are characteristic of this genus.

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membranâ continuâ hyalinâ intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fr. ignota.

CAULERPA *Muelleri;* surculus robust, densely covered with cylindrical, dichotomous scales; frond erect, stipitate, oblong, obtuse, pinnated, stipes and pinnæ everywhere densely clothed with binate, basally united, cylindrical, obtuse, emarginate and bimucronulate, erect, imbricated, dark green ramenta.

C. Muelleri; *surculo crasso squamulis cylindraceis dichotomis dense muricato; fronde erecta stipitata oblonga obtusa pinnata; stipite pinnisque foliolis undique densissime obtectis; foliolis geminis basi unitis cylindraceis obtusis apice bimucronulatis erectis imbricatis intense viridibus.*

CAULERPA Muelleri, *Sond. in Linn. v.* 25. *p.* 661. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 564; *Alg. Austr. Exsic. n.* 551.

HAB. On the steep sides of deep rock-pools and vertical reefs, below low-water mark. Rivoli Bay, South Australia, *Dr. Mueller.* Abundantly at Rottnest Island, Western Australia, and at Port Fairy, Victoria *W. H. H.* Fremantle, *Mr. Clifton.*

GEOGR. DISTR. Western and southern shores of Australia.

DESCR. *Surculi* several inches long, two lines in diameter, densely covered with very short, divaricately forked, rigid cylindrical squamæ, the tips of whose branches are bimucronulate. *Fronds* 8–12 inches long, of an elliptic-oblong, obtuse outline, closely and distichously pinnate from the apex to within 1–2 inches of the base; the pinnæ uniform and subequal, 1½–2 inches long, erecto-patent; both rachis and pinnæ entirely covered with densely inserted, imbricated, suberect leaflets or ramenta. *Ramenta* 1–2 lines long, inserted on all sides, in pairs, connate at base (or the ramentum may be regarded as forked, but the forking just above its base).

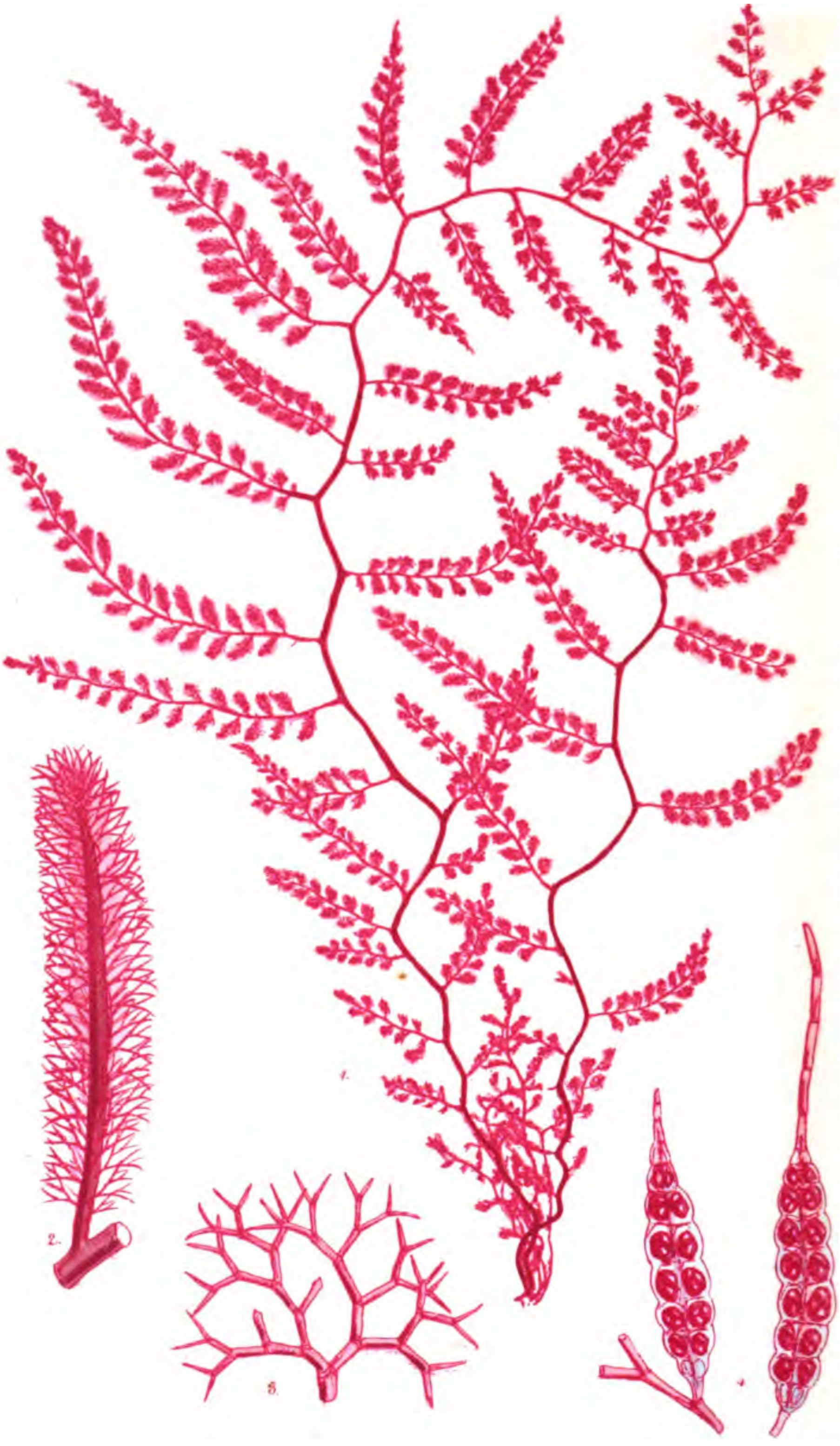
cylindrical or slightly unequal, not attenuated, emarginate and bimucronulate at the summit; each mucro bidentate. The ramenta toward the lower part of the rachis are less regularly formed, and near the base are short. and gradually assimilated at the very base with the squamæ that cover the surculus. *Substance* horny-membranous when dry, soft but firm when recent. *Colour* when growing a very dark full green. In drying the plant very imperfectly adheres to paper.

This fine species, when seen in its place of growth, freely waving its dark-green fronds under the clear water of the reefs at Rottnest Island, resembles nothing so much as the branches of the Norfolk Island Pine in miniature, in allusion to which I had called it *Caulerpa Araucaria*, before I ascertained that Dr. Sonder had bestowed upon it the name of an earlier finder, my valued friend Dr. FERDINAND MUELLER, Director of the Melbourne Botanic Gardens. No one has contributed more than Dr. Mueller to elucidate all branches of the botany of the colony in which he resides, and no one is more worthy of receiving a tribute of this kind.

It will be at once perceived, on comparing our figure with that of *Caulerpa hypnoides* in Turn. Hist. Fuc. t. 173, that there is a very strong resemblance to that well-known species; so strong, that without a careful examination they may readily be mistaken for one another. I have seen both growing abundantly on their native rocks, and can, at a glance, distinguish the present by its much darker colour, more robust growth, more erect ramenta, and the less densely set, and less finely divided scales of the creeping stems. A more definite character may be found in the ramenta, which, in *C. hypnoides*, are not merely connate at base in pairs, but united for some distance above the base, so as to be as distinctly forked as in *C. furcifolia*. The magnified figures in Turner's plate are not correct.

Fig. 1. CAULERPA MUELLERI,—*the natural size*. 2. A pair of twin leaflets or ramenta. 3. Apex of one of them. 4. A transverse section of a leaflet, to show the anastomosing fibres that spring from the inner face of the membranous wall; the endochrome has been removed. 5. One of the forked squamæ from the surculus. 6. Apex of one of its branches:—the latter figures *magnified*.

Plate III.



Vincent Brooks imp.

PLATE III.

DASYA CLIFTONI, *Harv.*

GEN. CHAR. *Frond* filiform or compressed, dendroid; stem and branches coated with small, polygonal cellules (rarely articulate and many-tubed), the axis articulate, composed of numerous radiating cells surrounding a central cavity; ramelli articulated, one-tubed. *Fructification:* 1, ovate or urceolate *ceramidia*; 2, lanceolate *stichidia*, attached to the ramelli, and containing triangularly parted *tetraspores* in transverse rows.—DASYA (*Ag.*), from δασυς, *hairy*.

Frons filiformis v. compressa, dendroidea. Caulis ramique majores strato cellularum corticati (raro pellucide articulati,) ramellis monosiphoniis obsessi; axis articulatus, ex cellulis pluribus radiantibus tubum centralem cingentibus formatus. Fruct.: 1, *ceramidia ovata v. urceolata;* 2, *stichidia lanceolata, ex ramellis enata, tetrasporas transversim ordinatas foventia.*

DASYA *Cliftoni;* stem long, slender, flexuous or spiral, glabrous, inarticulate, subdistichously branched, bi-tripinnate; pinnæ patent, glabrous; pinnules alternate, subdistant, ramelliferous; ramelli divaricately much branched, dichotomous, scarcely attenuate, obtuse, their articulations 3–4 times longer than broad; stichidia lanceolate.

D. Cliftoni; *caule pedali tenui flexuoso v. scandente glabro corticato subdistiche ramoso bi-tripinnato; pinnis patentibus glabris, pinnulis alternis remotiusculis ramellosis; ramellis multoties divaricato-dichotomis vix attenuatis obtusis, articulis diametro* 3–4-*plo longioribus; stichidiis lanceolatis.*

DASYA Cliftoni, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 542; *Alg. Austr. Exsic. n.* 200.

HAB. Dredged in Fremantle Harbour, by *Geo. Clifton, Esq.* Also collected at Garden Inland and Rottnest, and at King George's Sound, Western Australia, *W. H. H.*

GEOGR. DISTR. As above.

DESCR. *Fronds* very densely tufted, and rarely extricable, a foot or more in length, about the thickness of hog's bristle, gradually attenuated upwards, subdistichously bi-tripinnate. The main stem and primary branches are everywhere inarticulate, being coated externally with a layer of slender, cylindrical, longitudinal, parallel cellules, and are glabrous or bare of ramelli; the penultimate branchlets or pinnules are alone ramelliferous. These are from quarter to half an inch in length, and densely clothed on all sides with dichotomous ramelli, which are peculiarly crowded at the tips, into a dense dark spot-like fascicle. These ramelli are about the tenth of an inch long, very many times forked, the forkings divaricate; they are not much attenuated upwards, nor are the ultimate divisions drawn out into slender fibres, but end in a short, obtuse point. They are single-tubed, the articulations about thrice or four times as long as broad, but varying in length in different specimens. The *ceramidia* have not yet been discovered. The *stichidia* are lanceolate, acuminate, and sometimes ending in a hair-like point, and are borne on the ramelli; they contain tetraspores set in a double row. The *colour*, when growing, is a full, deep blood-red, becoming brighter in fresh water. The *substance* is soft, but not gelatinous, and the plant adheres firmly to paper in drying.

The genus *Dasya* is particularly rich in species on the Australian coast, and many beautiful species of it have already been figured, with more or less detail, in the Author's 'Nereis Australis.' Many others of recent discovery remain, which it is proposed to figure in the present work. Of these the present delicate species is one; and this I have elsewhere inscribed to its indefatigable discoverer, *George Clifton, Esq.*, of Fremantle, Western Australia, to whom I am indebted for many hundred well-dried specimens of the Algæ of Western Australia, and who has already added several new ones to our previous list, and from whom much is still to be expected.

The present species was one of his earliest discoveries, and was named by me in commemoration of a pleasant day's dredging off Fremantle, when we first fished up this and several other beautiful forms, both animal and vegetable. I afterwards obtained it in quantity, both at Rottnest and King George's Sound. It is nearly allied to *D. elongata*, Sond., but is a much more slender plant, almost always occurring in dense tufts; and its stems are either wavy and zigzag, or spirally twisted round each other or round neighbouring objects. These characters, with its brighter colour and softer substance, sufficiently distinguish it.

The *ceramidia*, when found, may perhaps afford an additional distinction.

Fig. 1. Dasya Cliftoni,—*the natural size*. 2. A pinnule clothed with ramelli. 3. A ramellus. 4. Stichidia:—the latter figures more or less *magnified*.

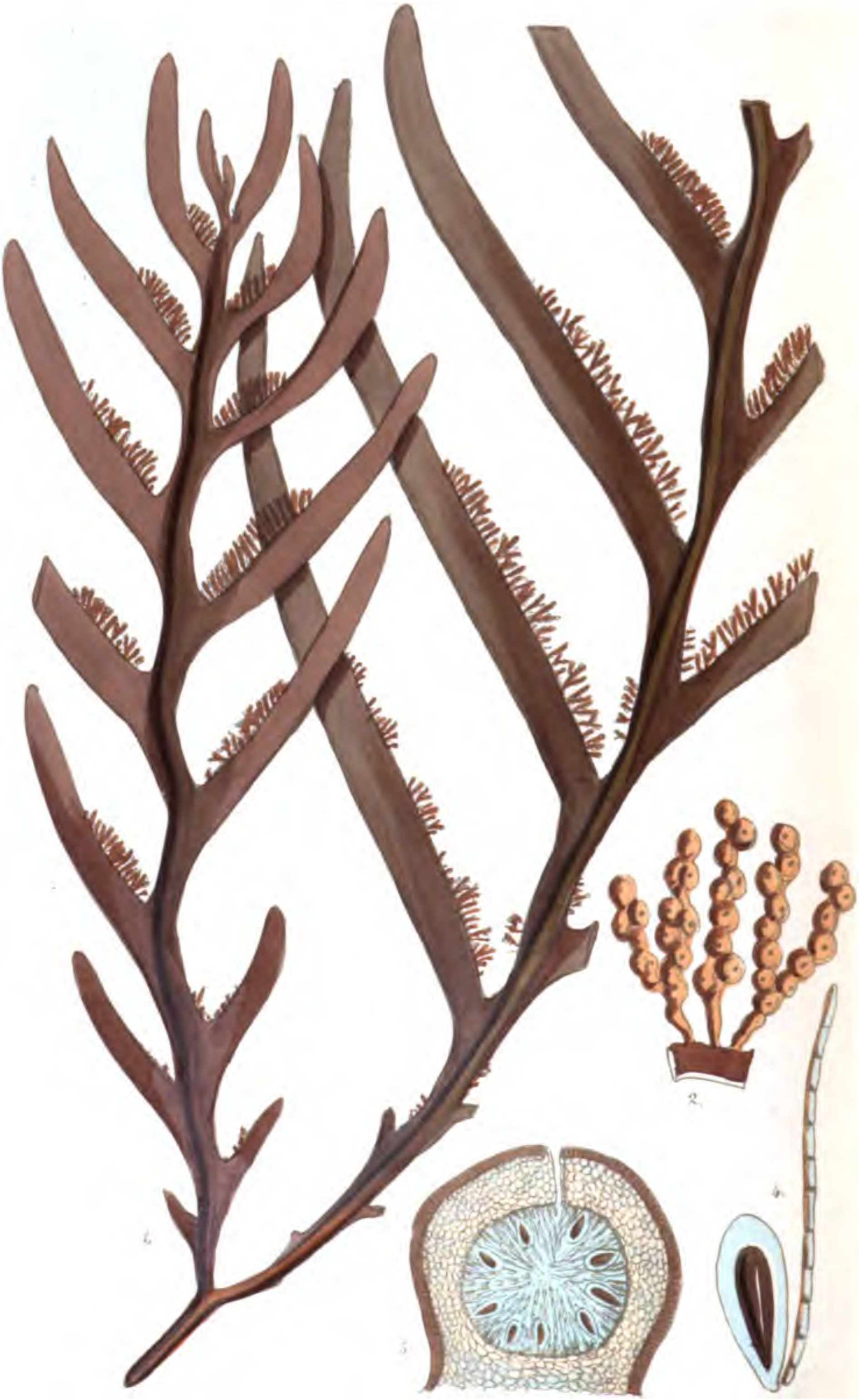

1.
2.
3.
4.

Plate IV.

SEIROCOCCUS AXILLARIS, *Grev.*

Gen. Char. *Root* branching. *Frond* distichous, linear, midribbed, alternately decompound; the branches vertically flattened, pinnatifid. *Vesicles* none. *Receptacles* distinct, fringing the margin of the laciniæ, moniliform, slender, of densely cellular substance, poriferous, containing under each pore a monœcious spore-cavity. *Spores* obovoid, subsessile. *Antheridia* oval, on branching filaments. *Paranemata* simple.—Seirococcus (*Grev.*) from *σειρα, a chain,* and *κοκκος, a berry;* because the receptacles are chain-like.

Radix ramosa. Frons disticha, linearis, costata, alterne decomposita, ramis verticalibus pinnatifidis. Vesiculæ nullæ. Receptacula propria, secus marginem evoluta, moniliformia, gracilia, dense cellulosa, ostiolis pertusa. Scaphidia monoica. Sporæ obovoideæ, subsessiles. Antheridia racemosa. Paranemata simpliciuscula.

Seirococcus *axillaris,* Grev.

Seirococcus axillaris, *Grev. Alg. Syn. p. xxxiv. Endl. 3rd Suppl. p.* 33. *J. Ag. Sp. Alg. v.* 1. *p.* 260.

Scytothalia axillaris, *Mont. Voy. Pôl. Sud, v.* 1. *p.* 86. *Kütz. Sp. Alg. p.* 593.

Cystoseira axillaris, *Ag. Sp. Alg. p.* 80; *Syst. p.* 291.

Fucus axillaris, *R. Br. in Turn. Hist. Fuc. t.* 146.

Hab. In the Laminarian zone. South coasts of New Holland, east of Cape Northumberland, and on the shores of Tasmania.

Geogr. Distr. Not known beyond the above limits.

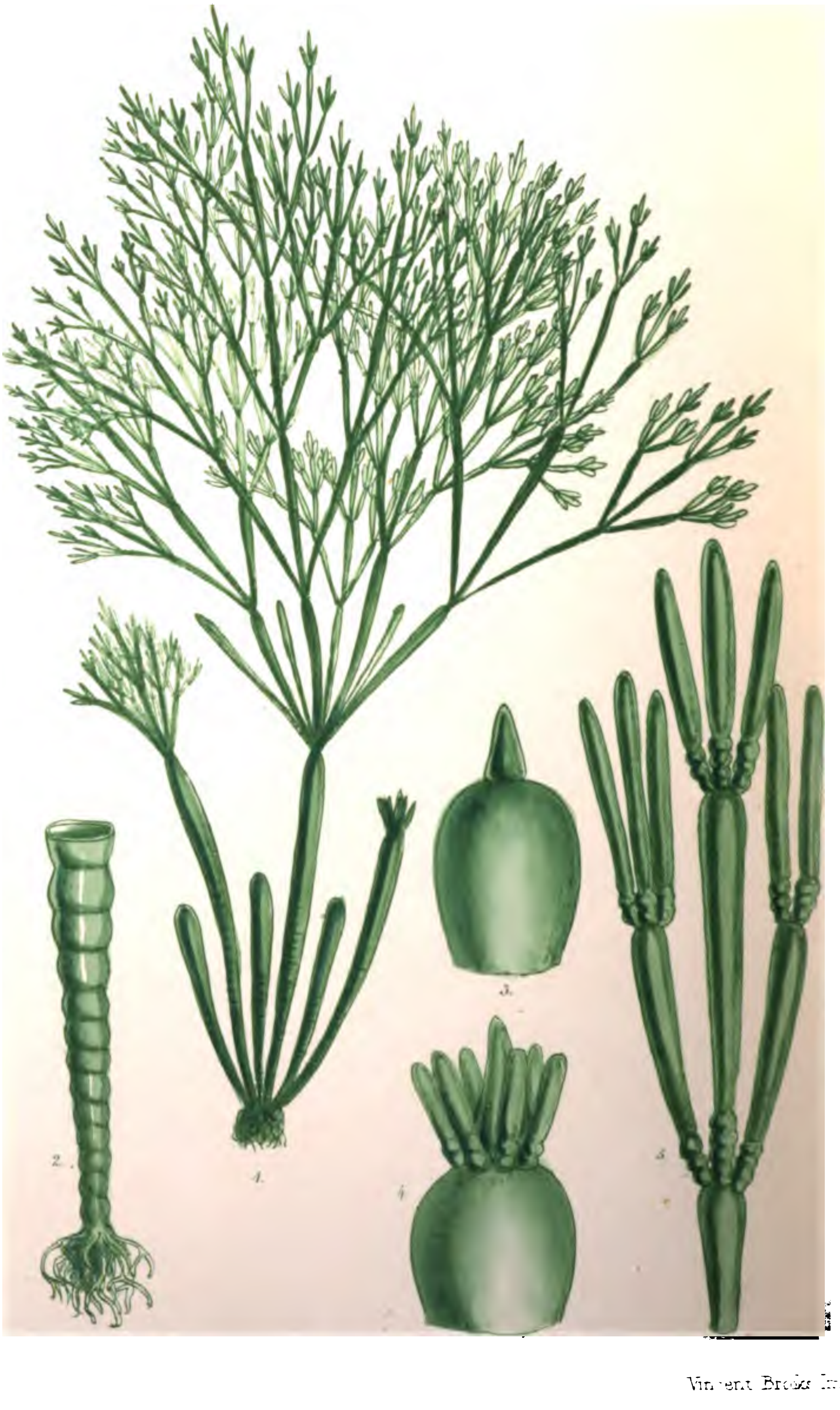
Descr. *Root* a disc, throwing out numerous radiating branched and clasping fibres. *Frond* 3–6 feet long or more, distichous, alternately decompound, with a flexuous rachis, as if the proper ramification were dichotomous, but one fork of the dichotomy regularly alternately suppressed throughout. The stem is compressed, about two lines broad, and about 2–3 inches in length to the first branch; thence upwards it becomes more compressed, and at length flattened, linear, and traversed by a flat, immersed rib, which is continued to the apex, and is more or less evident in all the branches, but not in the ultimate laciniæ. The branches issue from the sharp edge of the stem, are subfiliform, but compressed at base, like the stem, flattened upwards, linear, ribbed, flexuous and pinnatifid; laciniæ linear-strap-shaped, somewhat falcate, obtuse or subacute, 4–6 inches long, and rather more than ¼ inch broad. *Receptacles* 2 lines long, pedicellate and apiculate, filiform, becoming verrucose or moniliform as they approach maturity, developed along the margin both of the rachis and of the laciniæ, and sometimes densely fringing these parts for some inches in extent, at other times not extending far from the axillæ. The cellular substance of which the receptacle is composed is dense and uniform, but the greater part is hollowed out into spore-cavities which communicate with the surface by a pore, one cavity lying under each of the bead-like warts of the receptacle. These cavities are lined with long simple filaments (*paranemata*), among which both spores and antheridia are found. The *spores* are narrow-obovoid, each surrounded by a pellucid perispore; the antheridia ovate, bright yellow, and attached, in a sort of raceme, to branching filaments. The *substance* is coriaceous, somewhat horny when dry. The *colour* is a dark olive-brown, becoming darker in the herbarium.

One of the many remarkable *Fucoids* of Australia discovered by Dr. R. Brown, and first figured in Turner's 'Historia Fucorum.' There is an extraordinary resemblance in the whole development of the frond between this plant and *Scytothalia dorycarpa*, Grev. (to be figured in our next number); so great that both Montagne and Kützing regard them as referable to the same genus. I rather follow Greville and Agardh, in keeping them apart, if the principles on which genera have been established among the *Fucaceæ* are to be observed, for there is a remarkable difference in the structure of their receptacles. Besides this difference in inflorescence, a minor character exists, which can only be observed in the living plant, but which is indicative of a difference of nature. When a *Scytothalia* is steeped in fresh-water it throws out, like a *Fucus*, an immense quantity of slimy gelatine, but this is not the case with *Seirococcus*.

The geographical distribution of these plants is also different; the *Seirococcus* being a genus of eastern, and the *Scytothalia* of western Australia.

Fig. 1. SEIROCOCCUS AXILLARIS; portion of a branch,—*the natural size.* 2. Some of the marginal receptacles. 3. Semi-cross-section of a receptacle, showing one of the immersed spore-cavities containing spores and paranemata. 4. A spore and paranema removed:—the latter figures more or less *magnified.*

Plate V



Vincent Brooks Imp.

Ser. CHLOROSPERMEÆ. Fam. *Valoniaceæ.*

PLATE V.

APJOHNIA LÆTEVIRENS, *Harv.*

GEN. CHAR. *Frond* stipitate, dendroid. *Stipes* rooting, unicellular and monosiphonous, transversely rugulose, thinly coated with calcareous matter, at maturity crowned with a pencil of branches. *Branches* confervoid, umbellate, polychotomous, fastigiate, free, articulated; articulations clavate, annulated at base, and filled with bright green watery endochrome.—APJOHNIA (*Harv.*), in honour of Professor Apjohn of Dublin, and of Mrs. Apjohn, a zealous algologist.

Frons stipitata, dendroides. Stipes radicatus, monosiphonius, clavatus, continuus, annulatim constrictus et transversim rugulosus, epidermide tenui calcarea donatus, in ætate majore ramis coronatus. Rami confervoidei, umbellati, polychotomi, fastigiati, liberi, articulati; articulis clavatis, omnibus basi nodoso-annulatis, succo aquoso viridissimo repletis.

APJOHNIA *lætevirens*, Harv.

APJOHNIA lætevirens, *Harv. in Tayl. An. Nat. Hist. ser.* 2. *v.* 15. *p.* 335. *Harv. Alg. Austr. Exsic. n.* 566.

HAB. On the steep sides of rock-pools, near low-water mark. Philip Island, Western Port, and at Port Fairy, Victoria, *W. H. H.* Port Lincoln, South Australia, *Mr. Wilhelmi.*

GEOGR. DISTR. As above.

DESCR. *Fronds* rising from a mass of very tough and rigid, branching, unicellular fibres, densely tufted, 3–6 inches high, stipitate and tree-like. *Stipes* from 1–2 inches long, club-shaped, nearly two lines in diameter at the thickened upper extremity, tapering gradually to the base, consisting of a single cell filled with watery fluid. In the first stage of growth the whole frond consists of this *stipes*, which is then of a bright green colour, quite obtuse or rounded at the extremity, and scarcely at all coated with calcareous matter. As the frond progresses toward maturity, a minute conical cell, which never increases much in length, is formed at the apex of the stipes; and round the base of this cell a whorl of cylindrical, basally nodoso-constricted cells are gradually developed. These latter increase in length, and as they grow, each emits from its summit generally three similar cells; and this process is repeated several times, till there results a penicillate umbel of trichotomous, confervoid, articulate branches. Every internode or articulation of the branches is annularly constricted towards the base. At first the branches, like the young stems, are membranous and glossy, but they afterwards become thinly incrusted with carbonate of lime. The *substance* is firmly membranaceous, and the plant very imperfectly adheres to paper in drying. The *endochrome* is of a vivid green colour, but is thin and watery.

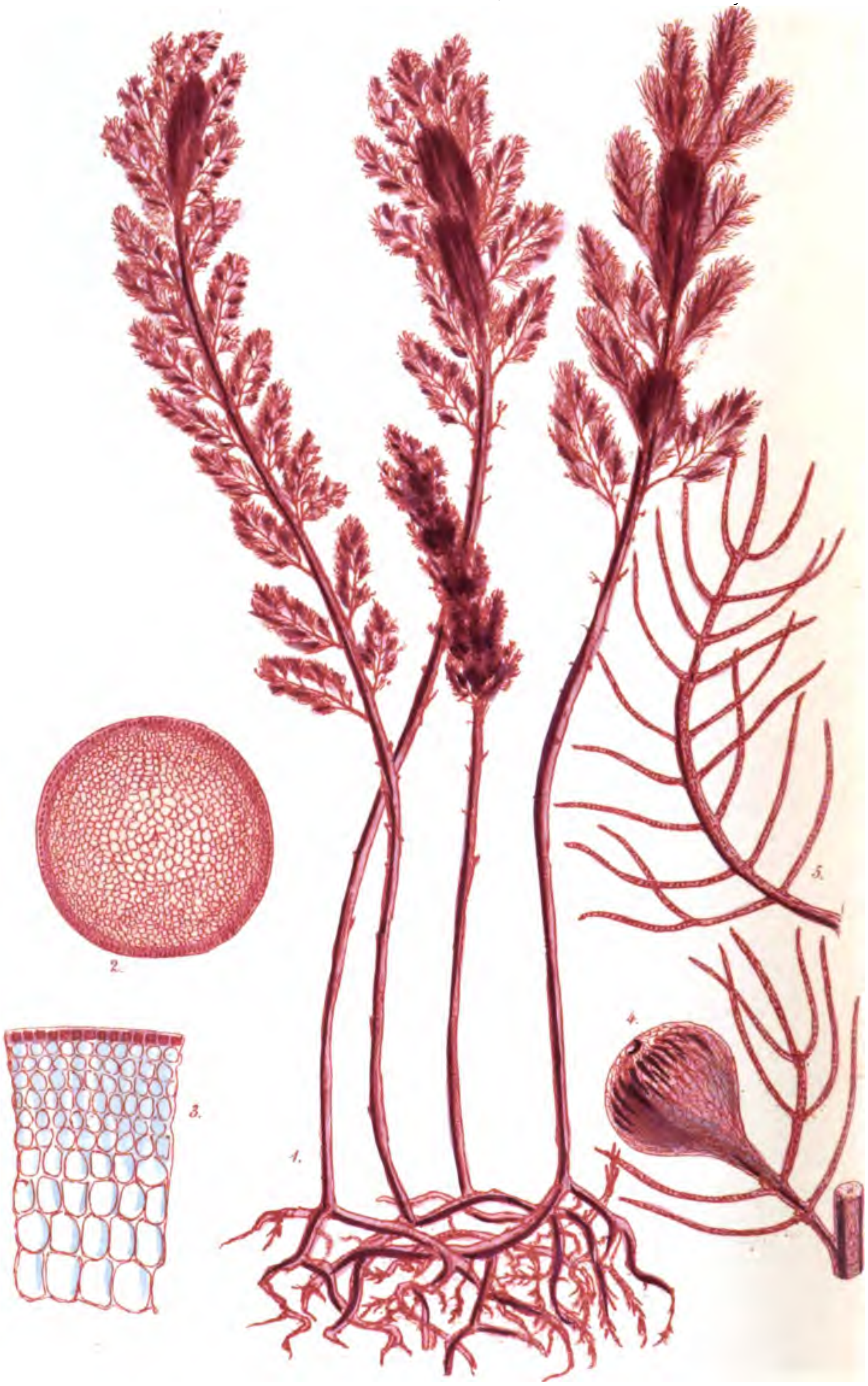
At first sight the plant here figured may pass for a very robust species of *Cladophora*, of the division to which *C. pellucida* belongs. But a closer examination reveals characters which force us to remove it far from *Cladophora*, and to associate it with the small group of confervoid Algæ which is typified by *Valonia*. These characters are,—the branching fibrils that issue from the base of the first-formed cell; the annular constrictions of the cells, both primary and those afterwards formed; the deposition of carbonate of lime, as a superficial coating; the watery contents of the cells; and, finally, the mode of development.

Among Australian Algæ *Apjohnia* will stand next to *Struvea*, from which it is distinguished by the dendroid or umbellate habit, and the non-anastomosis of the branches of its crown. The substance and mode of development are similar. It is more closely allied to the West Indian *Chamædoris*, with which it nearly agrees in technical character, but the habit is so dissimilar, that I have not hesitated to separate them. In *Chamædoris* the tubular stipes is headed by a dense mop-like capitulum of dichotomous filaments, closely interwoven, and whose articulations are filiform, without annular constrictions: the stipes and root and mode of development are as in *Apjohnia*.

My earliest specimens were collected at Port Fairy. I afterwards obtained much more perfect ones at Philip Island, and more recently still received from Mr. Wilhelmi a specimen from Port Lincoln. The range of the species therefore is probably greater, perhaps extending along the whole southern coast.

Fig. 1. APJOHNIA LÆTEVIRENS,—*the natural size*. 2. Base of a stipes, to show its roots and the annular constrictions of the tube. 3. Apex of a young stipes, after the formation of the axial cellule. 4. Another apex, showing the commencement of the umbellate branches. 5. Apex of a full-grown trichotomous branch:—the latter figures *magnified*.

Plate VI



Vincent Brooks Imp.

Ser. RHODOSPERMEÆ. Fam. *Laurenciaceæ.*

PLATE VI.

ASPARAGOPSIS SANFORDIANA, *Harv.*

GEN. CHAR. *Frond* filiform, inarticulate, thyrsoideo-paniculate; branches penicillate, pinnately decompound, the ultimate ramelli setaceous, laxly cellular (not articulate). *Fructification:* 1, ovate, pedunculate *ceramidia,* containing, within a membranous pericarp, a dense tuft of pear-shaped spores; 2, *tetraspores* . . . ?—ASPARAGOPSIS (*Mont.*), from *asparagus,* the well-known vegetable so called, and *οψις,* a *resemblance.*

Frons filiformis, inarticulata, filo articulato monosiphonio percursa, thyrsoideo-paniculata. Rami (breves) penicillati, pinnatim decompositi et in ramellos setaceos laxe cellulosos soluti. Fruct.: 1, *ceramidia pedunculata, a ramulo transformata, intra pericarpium membranaceum poro pertusum sporarum fasciculum foventia; fila sporifera ramosissima. Tetrasporæ ignotæ.*

ASPARAGOPSIS *Sanfordiana;* stems rising from robust, much branched rhizomes, erect, simple, naked below, densely thyrsoid above the middle, the penicillate branchlets obtuse (in outline); ramelli decompound-pinnate, pinnules opposite, incurved; ceramidia globose, attenuated at base into the clavate peduncle.

A. Sanfordiana; *surculo valido ramosissimo caules plures emittente; caulibus erectis simplicibus e basi longe nudis supra thyrsoideo-penicillatis, penicillis ramellorum quoquoversum egredientibus eximie obtusis; pinnellis oppositis filiformibus crispato-incurvis; ceramidiis globosis basi in pedunculo clavato attenuatis.*

ASPARAGOPSIS Sanfordiana, *Harv. Trans. R. I. Acad. v.* 22. *p.* 544; *Alg. Austr. Exsic. n.* 241.

HAB. Rottnest Island, Western Australia; cast ashore, *W. H. H.*

GEOGR. DISTR. As above.

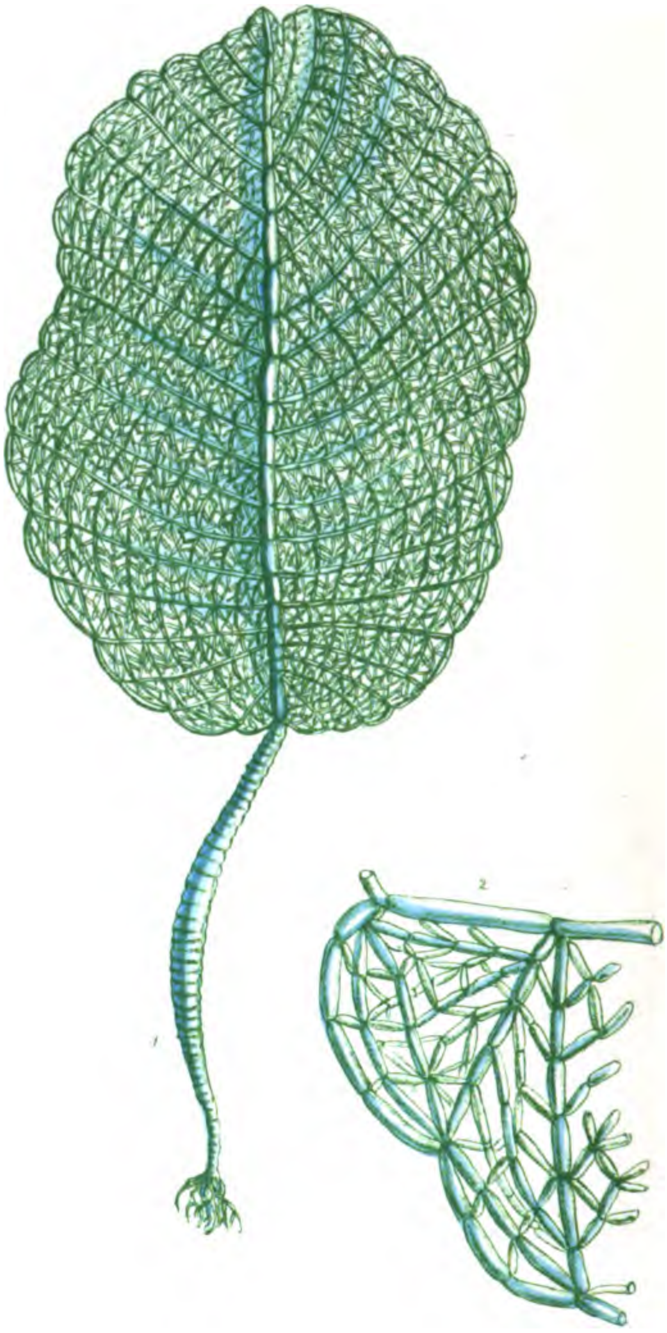
DESCR. *Root* or rhizome, a mass of much branched, entangled, creeping stems (surculi), as thick as crow-quills, throwing out below short branchlets set with a few subulate ramuli; and emitting upwards numerous erect stems, 6–8 or 10 inches long. These latter, or proper fronds, are as thick as the surculi below, but are gradually attenuated upwards, and in all my numerous specimens are quite simple. They are naked for half or three-fourths of their length, for the space of 4–6 inches above the base, and are densely clothed for the remainder of their length with penicillato-multifid branchlets. The branchlets are ½–1 inch long, closely inserted on all sides of the stem, many times pinnated and attenuated to a capillary fineness, so as to resemble little paint-brushes, and each *brush* is remarkably obtuse at its point, as is also the general thyrsus of brushes. The ultimate ramelli are filiform, attenuated, subcompressed, curved or curled inwards, and coated with polygonal irregular cellules. The stem is inarticulate, coated with minute cellules: but it is furnished with a slender, filiform, articulated, single-tubed axis; round which is a stratum formed of many rows of large, oblong, colourless cells, and these are protected externally by another stratum of minute, coloured cellules. The *ceramidia* are about as large as poppy-seed, and are formed at the apex of abbreviated, transformed ramuli, generally towards the lower part of the pencil in which they occur. They contain a very large tuft of spores, borne on much branched spore-threads. *Tetraspores* have not been discovered. The *substance* of the stem is firmly cartilaginous; that of the branches and ramelli very soft and flaccid; and in drying the plant adheres firmly to paper. The *colour* is a dark brownish or somewhat purplish red, tolerably preserved in drying.

I have already, in the memoir above quoted, distinguished the present from another Australian species of *Asparagopsis* to which I have given the name of *A. armata*. There can be no hesitation in pronouncing these two to be sufficiently distinct from each other; their peculiar characters being recognizable at all ages. But I am by no means so confident that the present will prove permanently distinct from *A. Delilei*, a plant with which I am less familiar, and which has a very wide geographical range, having been found in the Mediterranean Sea, in the Canaries, and at the Philippine Islands. It may therefore be Australian. And indeed I collected at Western Port, and have distributed as No. 243 of my Austr. Algæ Exsic., a few specimens that I referred to *A. Delilei*, and which appear to be different from the present. The *A. Delilei* of Ner. Austr. p. 88. t. 35 must be erased, the figure and description there given being partly taken from Australian and partly from Canary Island specimens, and a re-examination having shown that the Australian portion belongs to *A. armata*.

The chief characters which I suppose to distinguish my *A. Sanfordiana* are, the great size, dark colour, much branched and developed surculi, comparative length of the naked portion of the stem, and the rounded tips of the tufts of ramelli. It remains to be ascertained, by the examination of suites of Mediterranean specimens, whether these characters be of specific value.

Fig. 1. ASPARAGOPSIS SANFORDIANA,—*the natural size*. 2. Cross section of stem. 3. Small portion of the same. 4. Ramellus, with a conceptacle. 5. One of the alternate divisions of a ramellus:—the latter figures more or less *magnified*.

Plate XII.



Vincent Brooks

Ser. CHLOROSPERMEÆ. Fam. *Valoniaceæ.*

PLATE VII.

STRUVEA MACROPHYLLA, *Harv.*

GEN. CHAR. *Frond* stipitate, flabelliform. *Stipes* rooting, unicellular and monosiphonous, transversely rugulose, thinly coated with calcareous matter, at maturity crowned with an oblong, midribbed open network, composed of anastomosing, pinnately decompound, articulated, confervoid filaments. *Endochrome* bright-green, thin and watery.—STRUVEA (*Sond.*), in honour of H. de Struve, Ambassador from Russia to the Hanseatic Towns, and a patron of Natural History.

Frons stipitata, flabelliformis. Stipes radicatus, monosiphonius, continuus, annulatim constrictus et transversim rugulosus, epidermide tenui calcarea donatus, in ætate majore reticulo flabelliformi oblongo costato coronatus. Reticulum ex filis confervoideis articulatis distiche pinnatis anastomosantibus evolutum. Succus aquosus, viridis.

STRUVEA *macrophylla;* network (4 inches long) oblong-oval, crenate, its filaments many times pinnately decompound; articulations of the pinnæ 5–6 times, of the pinnules 3–4 times, as long as broad.

S. macrophylla; *flabello oblongo-ovali maximo* (4 *uncias longo,* 2½ *uncias lato*) *crenato, filis anastomosantibus pluries pinnatis, articulis pinnarum* 5–6-*plo pinnularum* 3–4-*plo diametro longioribus.*

STRUVEA macrophylla, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 564.

HAB. Champion Bay, Western Australia, *Mrs. Drummond, Jun.*

GEOGR. DISTR. As above.

DESCR. *Stipes* 2½–3 inches long, about 2 lines in diameter in the middle, tapering thence to the base and the apex, with a fibrous, branching root, unicellular, closely rugulose, transversely or annularly constricted throughout, and covered with a thin coating of carbonate of lime. *Flabelliform network* about 4 four inches long and 2½ inches wide, elliptic-oblong, crenato-lobulate at the margin, composed of an oppositely branched, decompound-pinnate, confervoid filament, whose branches and ramuli anastomose, leaving open spaces between. The primary pinnæ are about ¼ of an inch apart, erecto-patent and slightly curved upwards, and are continued, without branching, from the rachis (or midrib of the net) to the margin, where they are connected together by a sort of arch, forming one of the crenatures; these pinnæ emit at every node a pair of opposite pinnules, which are again at least twice divided (but less regularly), and all the apices of contiguous ramuli anastomose, so as to form a lace-like network. The filaments of the network are cylindrical, their articulations much longer than the diameter; those of the principal pinnæ at least five to six times, those of the smaller divisions four to five, and of the ultimate ones about two to three times as long as their diameter. The substance is firmly membranous and tough.

Colour no doubt has been *green*, but the only specimen yet seen is bleached quite white. *Fruit* unknown.

* * *

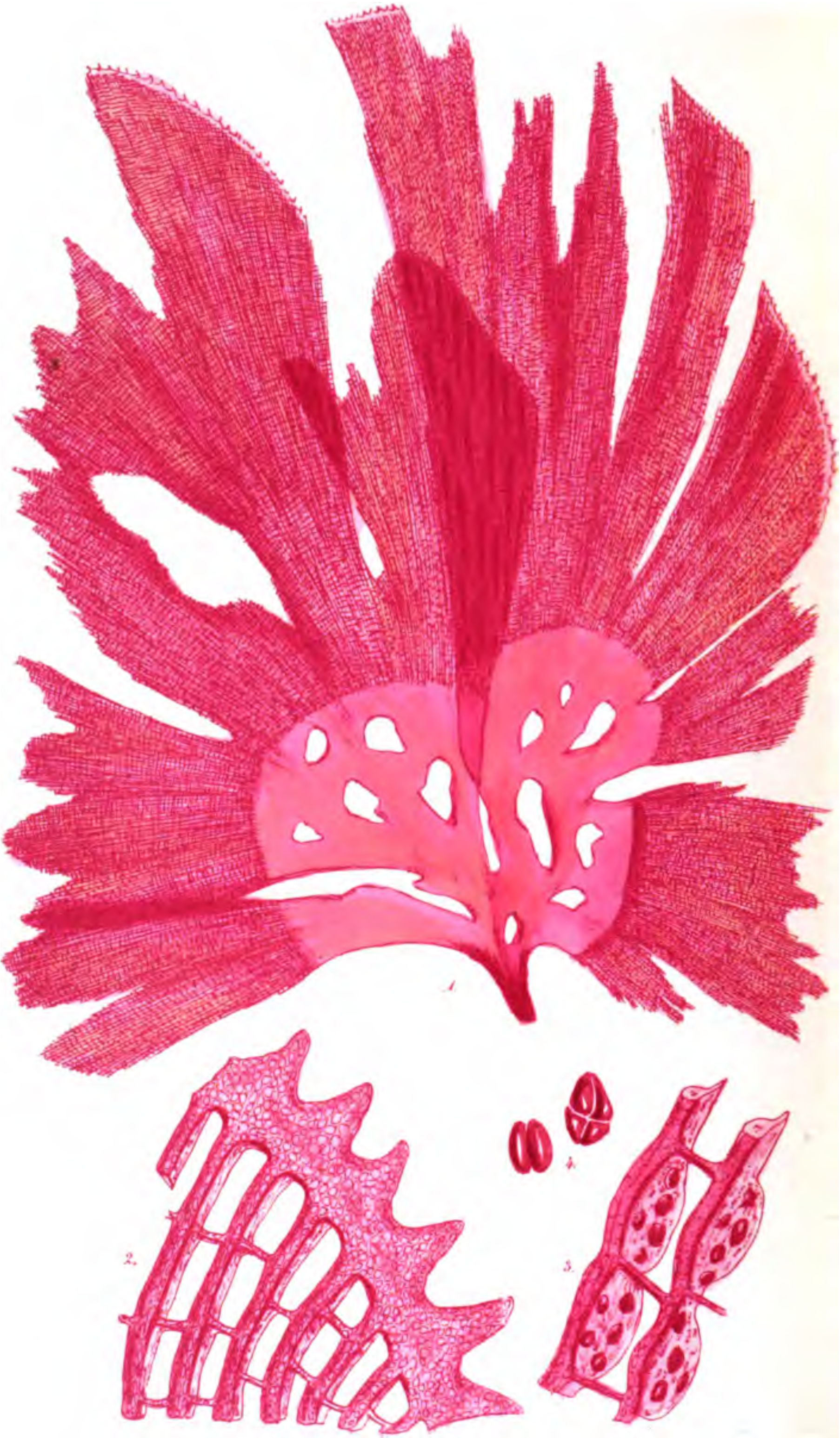
The Plate here given is drawn from a unique specimen, now preserved in the Herbarium of the University of Dublin, and which was given to me in 1854, by W. Ashford Sanford, Esq., of Nynhead Court, Somerset, at that time Colonial Secretary of Western Australia. Mr. Sanford had it from its discoverer, the daughter-in-law of Mr. James Drummond, who has so largely contributed to our knowledge of the plants of Western Australia. The original specimen is bleached to a creamy whiteness, and strikingly calls to mind some specimen of *old point-lace;* and as it is of a tough substance and sufficiently strong, it might be adapted to the use of the toilet by merely affixing it to a "foundation" of net. I have taken the liberty to strike the Plate in green, but in other respects the drawing is a faithful copy of the specimen.

The genus *Struvea* was established by Sonder, in 1845, on an Alga (*S. plumosa,* Sond.) brought by Preiss from Western Australia, and which is very abundant on the reefs at Rottnest Island. In a future number I propose to give a figure of it. At present I shall merely point out the characters by which our plant is distinguished from it. These are, the much greater size of the frond, the more complicated pattern of the lacework, and the greater proportional length of the cells of which the lace is composed.

I trust that Mrs. Drummond, or some other resident at Champion Bay, may again find it, and communicate duplicates that may enable me to distribute specimens among the subscribers to this work.

Fig. 1. STRUVEA MACROPHYLLA,—*the natural size.* 2. A small portion of the margin of the network,—*magnified.*

Plate VIII.



Vincent Brooks Imp.

Plate VIII.

MARTENSIA AUSTRALIS, *Harv.*

Gen. Char. *Frond* substipitate or sessile, membranous, nerveless, fringed (at maturity) with an open network, formed of vertical and horizontal anastomosing bars and cross-bars. *Fructification:* 1, *ceramidia,* containing, within a membranous pericarp, a dense tuft of pear-shaped spores; 2, *tetraspores,* usually lodged in the cross-bars of the network.—Martensia (*Hering*), in honour of Professor Martens, of Brussels.

Frons substipitata v. sessilis, membranacea, enervis, areolata, infra marginem (in ætate majore) clathrato-fenestrata; reticulo ex trabeculis verticalibus et horizontalibus formato. Fruct.: 1, *ceramidia;* 2, *tetrasporæ triangule divisæ in laminis verticalibus reticuli immersæ.*

Martensia *australis;* stipes cartilaginous, short, passing into the incrassated base of a many-lobed frond; margin of the network toothed.

M. australis; *stipite cartilagineo brevi in basi incrassata frondis multilobatæ membranaceæ desinente, margine reticuli dentato.*

Martensia australis, *Harv. Trans. R. I. Acad. v.* 22. *p.* 537; *Alg. Austr. Exsic. n.* 111.

Hab. Cast ashore. King George's Sound, *W. H. H.* Fremantle, Western Australia, *Mr. Clifton.* Tasmania, *Mr. Gunn and Rev. J. Fereday.*

Geogr. Distr. Western Australia, and Tasmania.

Descr. *Root* a fleshy disc. *Stipes* from half an inch to an inch in length, cartilaginous, compressed, one or two lines broad, becoming wider upwards and gradually passing into the thickened base of the frond. *Frond* 4–8 inches long (perhaps more?), the membranous portion about 3 inches long and broad, thin, delicately membranaceous, and areolated on the surface with polygonal cellules. Network gradually developed; in full-grown specimens 3–4 inches broad, lobed or frequently torn; the meshes irregular in size, usually longer than broad; but small and large occur together. Margin of the membrane entire or remotely denticulate; that of the network narrow and toothed or lacinulate. *Ceramidia* have not yet been found on this species. *Tetraspores* are abundantly immersed in the longitudinal bars or laminæ of the network in our specimens, and are either cruciate or triangularly parted. The *substance* is exceedingly thin and delicate, soon decomposing in fresh-water. The *colour* is a full, bright carmine or rose-red, and well preserved in drying, in which state the plant adheres closely to paper.

The genus *Martensia* was founded on an Alga (*M. elegans*) first found at Port Natal, South Africa, but which is now known to exist in Western Australia, and is particularly abundant in rock-pools at Newcastle, New South Wales. An earlier manuscript generic name, *Hemitrema*, was given it by Dr. R. Brown, but not having been duly published, it has yielded to that here adopted. A second species of the genus was collected by me at Ceylon; and subsequently I added two more from the Australian coast, and one from the shores of the Friendly Islands. Thus we are acquainted with *five* species of this curious genus, which ranges through a moiety at least of the Indian and Pacific Oceans.

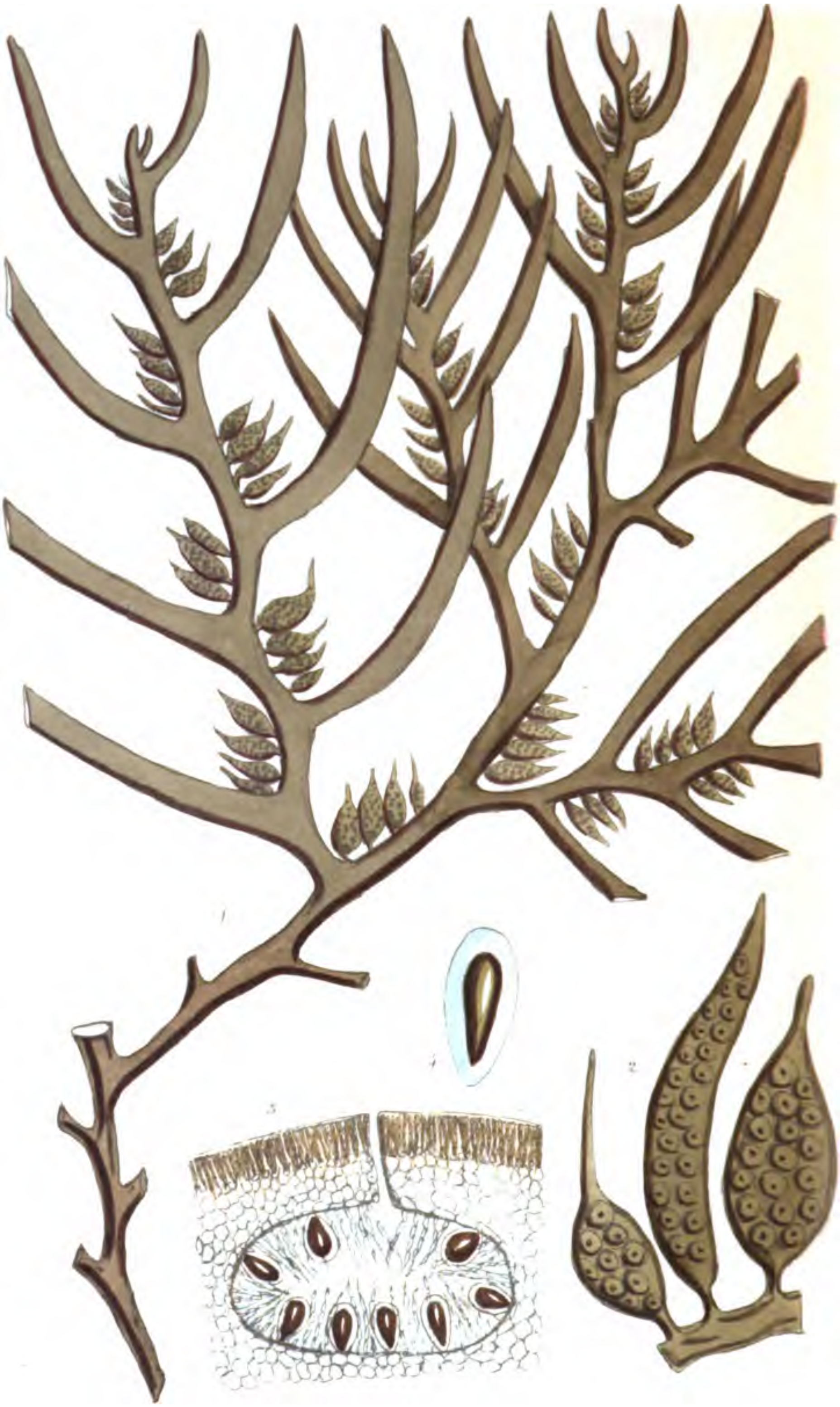
The subject of our Plate was first found by me in January, 1854, at King George's Sound, and supposing it to be the only Australian type of the genus, I named it *M. australis*. Much finer specimens, from one of which our drawing is taken, have since been received from Mr. Clifton, but as yet I have seen none in which the frond is not much lacerated. Fragments of very large size of what must either be this species or a new one, have been picked up at Georgetown, Tasmania, both by Mr. Gunn and the Rev. J. Fereday, but not in a sufficiently perfect state (wanting the base of the frond) to enable us to recognize them specifically.

M. australis is chiefly to be known from *M. elegans* by the cartilaginous stipes and thicker base of the frond. It is a larger and more luxuriant species, and has a broader fringe.

In a young state the several species of this genus are not to be distinguished by any character, either of structure or habit, from *Nitophylla*, and yet their fruit is formed on so different a type that they cannot be placed in the same family.

Fig. 1. MARTENSIA AUSTRALIS,—*the natural size*. 2. Small portion of the network, showing the toothed margin, and the areolation of the surface. 3. Some bars of the net, containing tetraspores. 4. Tetraspores:—the latter figures variously *magnified*.

Plate II.



Vincent [illegible]

PLATE IX.

SCYTOTHALIA DORYCARPA, *Grev.*

GEN. CHAR. *Root* branching. *Frond* distichous, linear, ribless, alternately decompound; the branches vertically flattened, pinnatifid. *Vesicles* none. *Receptacles* distinct, marginal, supra-axillary, flat, poriferous on both surfaces; containing under each pore a monœcious spore-cavity. *Spores* obovoid, sessile. *Antheridia* oval, on branching filaments. *Paranemata* simple.—SCYTOTHALIA (*Grev.*), from *σκυτος*, *leather*, and *θαλος*, *a branch.*

Radix ramosa. Frons disticha, linearis, costata, alterne decomposita, ramis verticalibus pinnatifidis. Vesiculæ nullæ. Receptacula propria, secus marginem evoluta, supra-axillaria, plana (ovata v. lanceolata), utrinque ostiolis pertusa. Scaphidia monoica. Sporæ obovoideæ, subsessiles. Antheridia racemosa. Paranemata simpliciuscula.

SCYTOTHALIA *dorycarpa*, Grev.

SCYTOTHALIA dorycarpa, *Grev. Alg. Syn. p. xxxiv. Endl. 3rd Suppl. p.* 33. *J. Ag. Sp. Alg. v.* 1. *p.* 258. *Kütz. Sp. Alg. p.* 592. *Harv. Alg. Austr. Exsic. n.* 28.

SCYTOTHALIA xiphocarpa, *J. Ag. Sp. Alg. v.* 1. *p.* 259. *Kütz. Sp. Alg. p.* 593. *Harv. Alg. Austr. Exsic. n.* 29.

CYSTOSEIRA dorycarpa, *Ag. Sp. Alg. p.* 80; *Syst. p.* 292.

FUCUS dorycarpus, *Turn. Hist. Fuc. t.* 143.

HAB. On rocks, just below low-water mark, and extending probably throughout the Laminarian zone. Western Australia, *Mr. Menzies, Dr. R. Brown.* Abundant at Middleton Bay, King George's Sound, and eastward to Cape Riche, *W. H. H.*

GEOGR. DISTR. South-west coasts of New Holland (not east of Cape Northumberland?).

DESCR. *Root* a flat disc, throwing out lateral, branching fibres. *Fronds* 1–3 feet long, linear, flat, coriaceous, distichous and alternately decompound, the branches springing from the sharp edge of the primary stem. The primary stem is compressed and two-edged throughout, somewhat thickened in the middle in its lower half, but nowhere distinctly midribbed. The branches are 1–2 feet long, about two lines wide, slightly flexuous, and alternately pinnatifid. The pinnæ are either simple or again similarly compounded; old specimens becoming excessively branched and dense, and occasionally proliferous, from wounded parts. The ultimate pinnules are 3–6 inches long, linear-falcate, erecto-patent, and tapering to an acute point. The *receptacles* spring along the margin of the secondary and tertiary branches, in the space between the pinnæ or from the edges of the pinnæ themselves; they vary much in shape, even on the same specimen, ovate, ovate-acuminate, or cuspidate, and linear-lanceolate, occurring frequently together. Their substance is densely cellular, and they are closely covered, on both surfaces, with tubercles, pierced with a pore, beneath each of which is an ovoid spore-cavity, bearing both *spores* and *antheridia;* the former attached to the walls, the latter to branching filaments, and both are surrounded by simple *paranemata.* The *spores* are nearly egg-shaped, with a wide perispore. The *substance* is coriaceous, becoming rather brittle when dry; when recent the frond contains a large quantity of mucus, which is discharged in fresh-water. The *colour* is a greenish-olive, becoming rusty in age, and reddish-brown when dried.

Under Plate IV. we have already remarked the strong resemblance between the subject of that and of the present Plate; the chief difference (colour and substance excepted) being in the form of the receptacles.

Professor J. Agardh separates our *S. dorycarpa* into two species, distinguished by the comparative length and form of the receptacles; but I find it impossible to hold up these forms, even as varieties, and believe that the characters observed by Agardh depend altogether on the depth of water at which the plant vegetates. The form called *S. xiphocarpa,* when truest to its type, is cast up from deep water. The ordinary *S. dorycarpa,* with ovate or ovate-lanceolate receptacles, occurs about low-water mark, or in rock-pools, between tide-marks; in the latter case being much stunted in growth and very densely ramified. Specimens connecting the two extreme states may easily be found.

Fig. 1. SCYTOTHALIA DORYCARPA; portion of a frond,—*the natural size.* 2. Receptacles, of various forms. 3. Section through a spore-cavity. 4. A spore:—the latter figures variously *magnified.*

Plate I

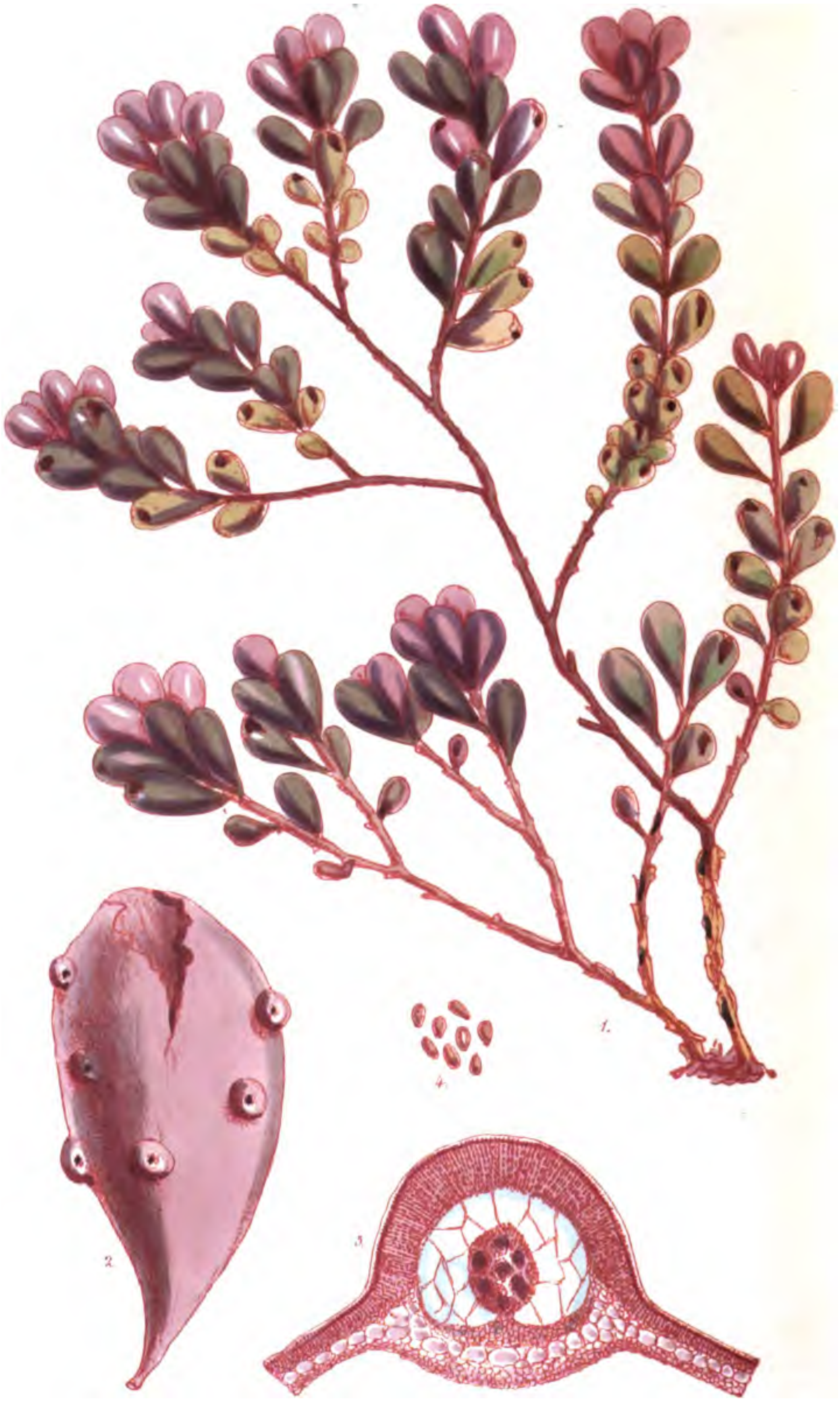


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PLATE X.

CHRYSYMENIA OBOVATA, *Sond.*

GEN. CHAR. *Frond* subterete or plano-compressed, tubular (or with a solid branching stem), branched; the tube empty or with percurrent filaments; peripheric stratum composed internally of large, roundish-angular, inflated cells, externally of minute, coloured, vertically seriated cellules. *Conceptacles* half-immersed in the frond, hemispherical or conical, containing a simple *nucleus* (*favella*) fixed to a basal placenta, surrounded by anastomosing filaments, and consisting of very numerous, densely packed, minute spores, enclosed in a membrane. *Tetraspores* cruciate, scattered among the superficial cells of the periphery.—CHRYSYMENIA (*J. Ag.*), from χρυσος, *gold*, and ὑμην, *a membrane.*

Frons tereliuscula v. plano-compressa, tubulosa (interdum caule solido donata), ramosa; filis paucis v. numerosis tubum percurrentibus; strato peripherico duplici, cellulis interioribus rotundato-angulatis vacuis, exterioribus minutis coloratis verticaliter seriatis. Cystocarpia semi-immersa, hemisphærica v. conica, ostiolo pertusa, favellam ad placentam basalem affixam filis anastomosantibus circumdatam foventia. Tetrasporæ cruciatim divisæ, sparsæ.

CHRYSYMENIA *obovata;* frond filiform, solid, irregularly dichotomous; the branches set with obovate, crowded, bag-like, horny-membranous ramuli; conceptacles hemispherical.

Ch. obovata; *fronde filiformi solida, vage dichotoma; ramulis obovoideis corneo-membranaceis undique dense insertis sparsisve primo succo repletis demum apice apertis et vacuis; cystocarpiis hemisphæricis.*

CHRYSYMENIA obovata, *Sond. Alg. Preiss. v.* 2. *p.* 176. *Harv. Ner. Austr. p.* 77. *Harv. Alg. Exsic. Austr. n.* 429.

GASTROCLONIUM obovatum, *Kütz. Sp. Alg. p.* 865.

CHONDRIA uvaria, *var.* obovata, *Ag. Sp. Alg. p.* 248.

GIGARTINA ovata, *Lamour. Ess. p.* 48. *t.* 4. *f.* 7.

RHABDONIA? globifera, *J. Ag. Sp. Alg. v.* 2. *p.* 355.

FUCUS globiferus, *Lamour. in Herb. Mus. Par.* (*fide J. Ag.*)

HAB. Western and southern shores of Australia, abundantly. In *fruit* at Carnac, Western Australia, *Mr. Clifton.* Common in the Tamar, above Georgetown, Tasmania, *W. H. H.*

GEOGR. DISTR. As above.

DESCR. *Root* discoid. *Fronds* densely tufted, 3–8 inches long. *Stem* filiform,

½ line in diameter, hard and rigid, solid, smooth or set with rough points, dichotomous or vaguely branched, the lower portions more or less naked. *Branches* simple, 2–4 inches long, densely covered on all sides with obovate, bag-like, sessile or minutely stipitate ramuli, which are nearly half an inch in length, and 2–3 lines wide at the widest part. These ramuli are of a firmly membranous texture, rigid and somewhat horny when dry, and when young are filled with a thinly gelatinous mucus. When old they are very generally ruptured at the extremity, and are then commonly found either empty or filled with sand. The cellular structure of the membrane is very dense, and in a triple series of cells; the inner lining being composed of small cells, the middle of larger, and the outer coat of minute, serrated cellules; all the cells are sometimes coloured, and sometimes the medial cells are colourless. The *conceptacles* are borne on the ramuli,' several often occurring together; they are hemispherical, thick-walled, with a large cavity, through which a cobwebby network of filaments extends; and they contain a central nucleus, consisting of minute oval spores. The nucleus appears divided into spaces, as if it arose (as it probably does) from the confluence of several primary or mother cells. The *substance* of the frond is rigid, and it does not adhere to paper in drying. The *colour*, when quite fresh, is a dark brownish-red, inclining to purple, but much more commonly the plant is found faded to a pale red, yellowish, or greenish, and is often bleached white on the strand.

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This plant is common on several parts of the Australian coast, but is rarely found in fruit. When cast ashore, and bleached to a yellowish or greenish white, it strongly resembles the egg-clusters of some of the Gasteropodous Mollusca, the substance being horny-membranous, and most or all of the ramuli being ruptured at the extremity. When young, the colour is purple, and the ramuli are filled with mucus.

It bears a very strong resemblance to *Ch. uvaria*, a species found in the Mediterranean, the Gulf of Mexico, and on the shores of tropical India, and a few fragments of which I dredged in Port Jackson. Our present plant differs from *Ch. uvaria* in colour, in more rigid substance, and in more obovate ramuli, and somewhat in its cellular structure, if not also in the compound nucleus. Still, I am very unwilling to separate it generically, as has been done by J. Agardh, who refers it to *Rhabdonia;* for what reason I know not. It differs much more from *Rhabdonia* (in my opinion, at least) than from *Ch. uvaria.*

Fig. 1. CHRYSYMENIA OBOVATA,—*the natural size.* 2. One of the ramuli, bearing conceptacles. 3. Section of a conceptacle, with part of the periphery of the ramulus. 4. Spores:—the latter figures more or less *magnified.*
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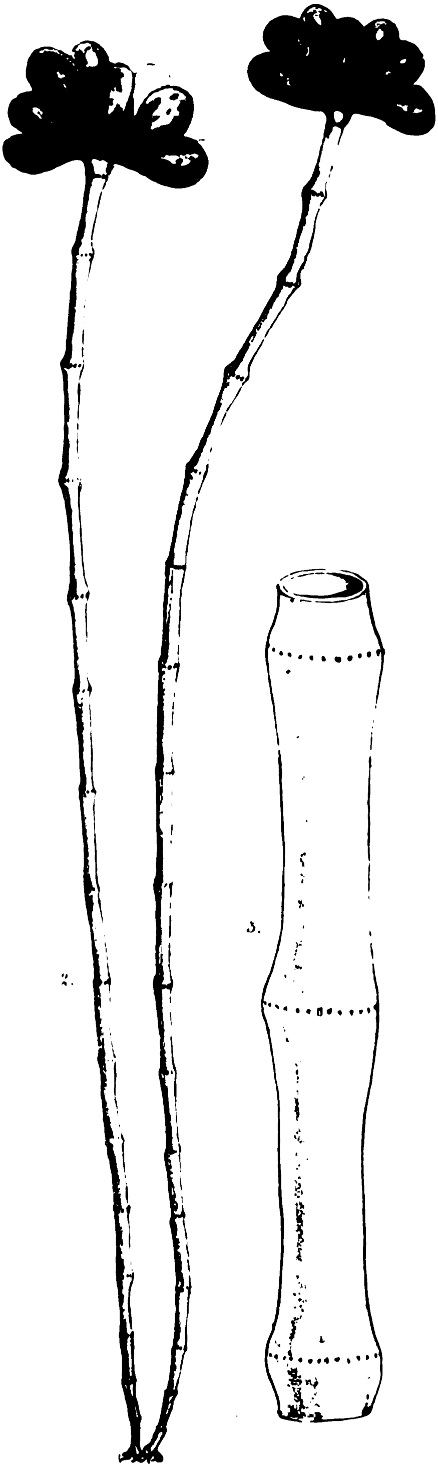
Plate II.



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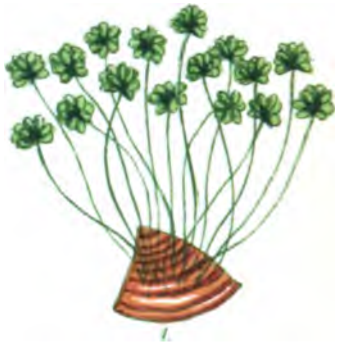

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Vincent Brooks Imp.

PLATE XI.

POLYPHYSA PENICULUS, *Ag.*

GEN. CHAR. *Root* scutulate. *Frond* pencil-like. *Stipes* cylindrical, unicellular, nodulose, crowned with a tuft of obovoid, saccate, unicellular ramuli, filled with grumous endochrome. *Spores* spherical, formed out of the contents of the ramuli.—POLYPHYSA (*Lamarck*), from *πολυ, many,* and *φυσα, a sac.*

Radix scutata. Frons penicilliformis. Stipes cylindraceus, unicellulosus, nodosus, apice ramulis vesicæformibus obovoideis membranaceis succo grumoso repletis coronatus. Sporæ globosæ, perisporio hyalino rigide membranaceo donatæ, ex succo ramulorum demum evolutæ.

POLYPHYSA *Peniculus;* stipes thinly incrusted with calcareous matter, the nodes swollen and pierced with a ring of small holes; ramuli broadly obovate.

P. Peniculus; *stipite calcareo-incrustato, nodis turgidis annulo foraminum pertusis; ramulis late obovatis.*

POLYPHYSA Peniculus, *Ag. Sp. Alg. v.* 1. *p.* 473. *Ag. Syst. p.* 192. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 564. *Harv. Alg. Austr. Exsic. n.* 565.

POLYPHYSA aspergillosa, *Lamour. Pol. Flex. p.* 252. *Endl. 3rd Suppl. p.* 17. *Kütz. Sp. Alg. p.* 510.

POLYPHYSA australis, *Lamarck, MS. in Mus. Par. (fide Lamour.)*

FUCUS Peniculus, *R. Br. in Turn. Hist. Fuc. t.* 228.

HAB. On old shells of bivalve and univalve mollusca, between tide-marks. Princess Royal Harbour, King George's Sound, *Dr. R. Brown, W. H. H., etc.* Port Lincoln, *Mr. Wilhelmi.*

GEOGR. DISTR. South-western Australia.

DESCR. *Root* a minute disc, showing a faint tendency to throw out clasping fibres. *Stipes* 1–2 inches in height, about the thickness of hogs' bristles, of an opaque white colour, and thinly covered with a smooth coating of carbonate of lime, tubular, formed of a single, long, cylindrical cell, marked at short intervals with rings of small holes, the tube being widened at each ring so as to divide the stipes into spaces resembling internodes or articulations. There is however no diaphragm at the spurious node, and consequently the jointed appearance is merely superficial. The *holes* are probably indicative of a whorl of byssoid ramelli, which possibly accompany the evolution of the stipes, but which have not as yet been observed: we infer their existence from the analogy of *Acetabularia,* where such ramelli, on falling away, leave similar traces. At the summit of the stipes, just above the last row of holes, is borne a tuft, 8–12 obovoid ramelli, each formed of a single saccate cell, and filled with bright-green granular endochrome. At first the contents of the ramulus is homogeneous; but at maturity the whole matter contained in the membranous envelope is converted into a multitude of spherical spores, each furnished with a very firmly membranous, almost horny perispore: the matter contained is granular, and may possibly be afterwards changed into *zoospores?* *Colour* of the ramuli a bright yellowish or grass green. *Substance* horny-membranous, somewhat rigid. When drying the plant scarcely adheres to paper.

The genus *Polyphysa* is evidently closely related to *Acetabularia,* and, like the latter, was once referred to the Animal Kingdom; the supposed animality being suggested by the somewhat horny substance of the membrane, and the coating of carbonate of lime which generally clothes the stem. Now that the limits between the Algæ and flexible Zoophytes are better understood, the truly vegetable nature of our plant is established.

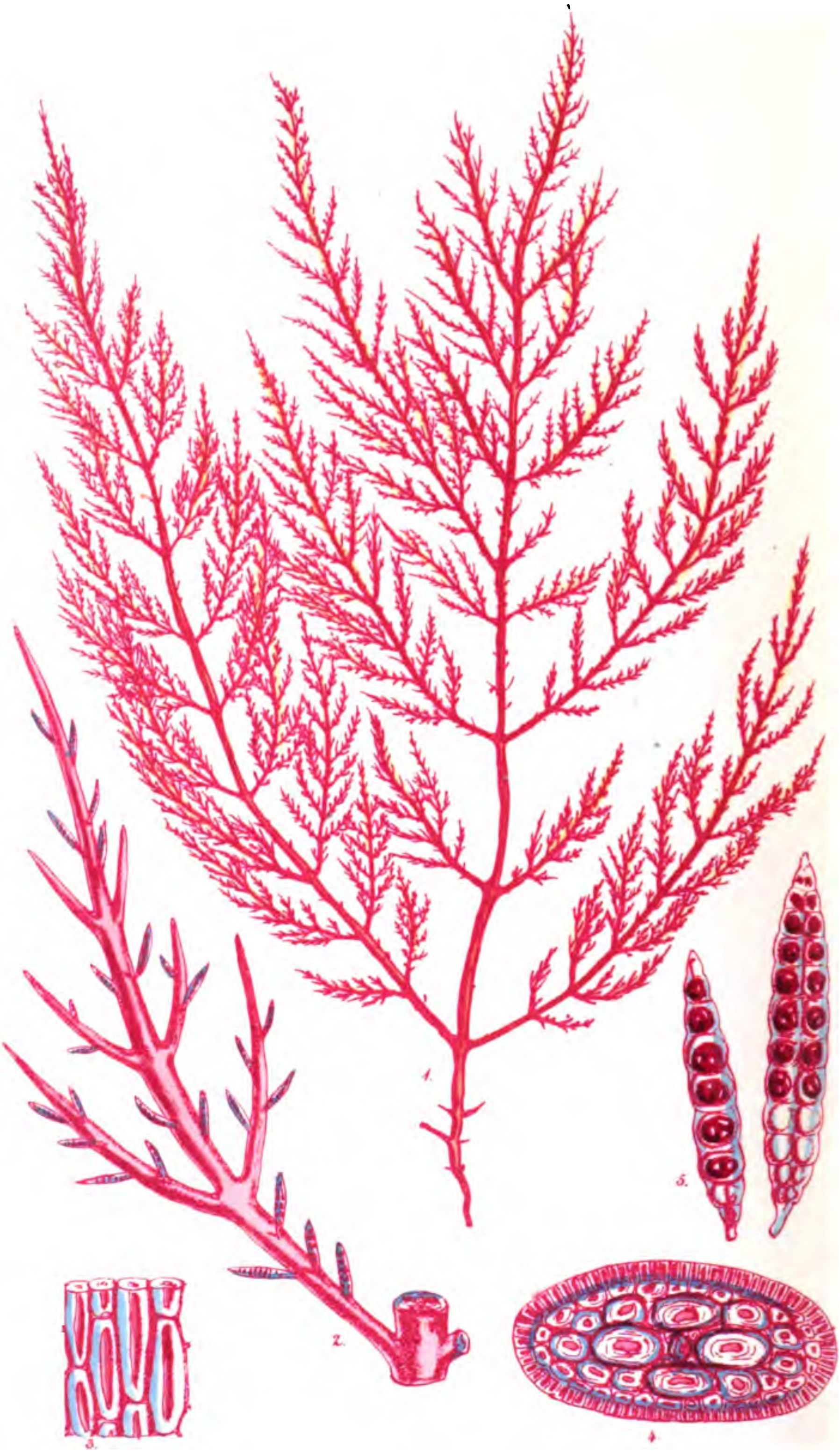
At Princess Royal Harbour this plant is very common opposite the town and for a mile or two higher up the harbour. It invariably (as far as I have seen) grows upon old shells, from which it perhaps derives the lime-coating of its stipes. The fronds, though often crowded, are not properly tufted, but each stands more or less apart. It is in perfection in January and February, and is apparently an annual. Its development has not yet been watched; and it would be desirable to know whether, at an early age, before the development of the saccate ramuli, its stipes may not be clothed with byssoid ramelli, as in *Acetabularia.*

I possess a second species, sent by Mr. Clifton from Swan River, and which may be thus briefly characterized:—

P. Cliftoni; *stipite membranaceo filiformi, nodis imperforatis; ramulis anguste claviformibus.*

Fig. 1. Polyphysa Peniculus, growing on a fragment of *Venus aurea,—the natural size.* 2. A pair of fronds,—*magnified.* 3. Portion of a stipes. 4. A node and annulus from the same. 5. A ramulus (or *sporangium*) containing spores. 6. The same, torn open, and some spores coming out. 7. Spores. 8. A spore, with its nucleus withered:—the latter figures more or less highly *magnified.*

Plate XII.



Vincent Brooks Imp

PLATE XII.

SARCOMENIA HYPNEOIDES, *Harv.*

GEN. CHAR. *Frond* flat and midribbed, or compressed, or terete, inarticulate, pinnately decompound or proliferous, carnoso-membranaceous, composed of two strata of cells; the inner stratum of oblong, thick-walled, gelatinous cells, in several rows; the outer of a single row of minute, coloured, vertical cellules. *Fructification:* 1. pedicellate, thick-walled *ceramidia*, containing a tuft of branching spore-threads, bearing pyriform spores; 2. lanceolate *stichidia*, containing tripartite *tetraspores* in a single or double row.—SARCOMENIA (*Sond.*), from *σαρξ, flesh*, and *ὑμην, a membrane.*

Frons plana, costata; v. compressa; v. teres; continua, pinnatim decomposita v. e disco prolifera stratis duobus contexta; strato medullari ex cellulis magnis oblongis gelineis crassis, peripherico ex cellulis minutis coloratis serie simplici dispositis verticalibus evoluto. Fruct.: 1, *ceramidia pedicellata intra pericarpium crassum ostiolo pertusum sporas pyriformes in filis ramosis terminales foventia;* 2, *stichidia lanceolata tetrasporas triangule divisas uni-biseriatas continentia.*

SARCOMENIA *hypneoides;* frond linear, very narrow, compressed, distichously much branched; branches and ramuli opposite, attenuated, acute, not narrowed at the base; stichidia lanceolate, scattered or tufted.

S. hypneoides; *fronde lineari angustissima compressa disticha ramosissima; ramis ramulisque oppositis attenuatis acutis basi nec angustatis; stichidiis lanceolatis sparsis v. fasciculatis.*

SARCOMENIA hypneoides, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 537. *Harv. Alg. Austr. Exsic. n.* 142.

HAB. Cast ashore at Fremantle, *Mr. Geo. Clifton.* At Garden Island, *W. H. H.*

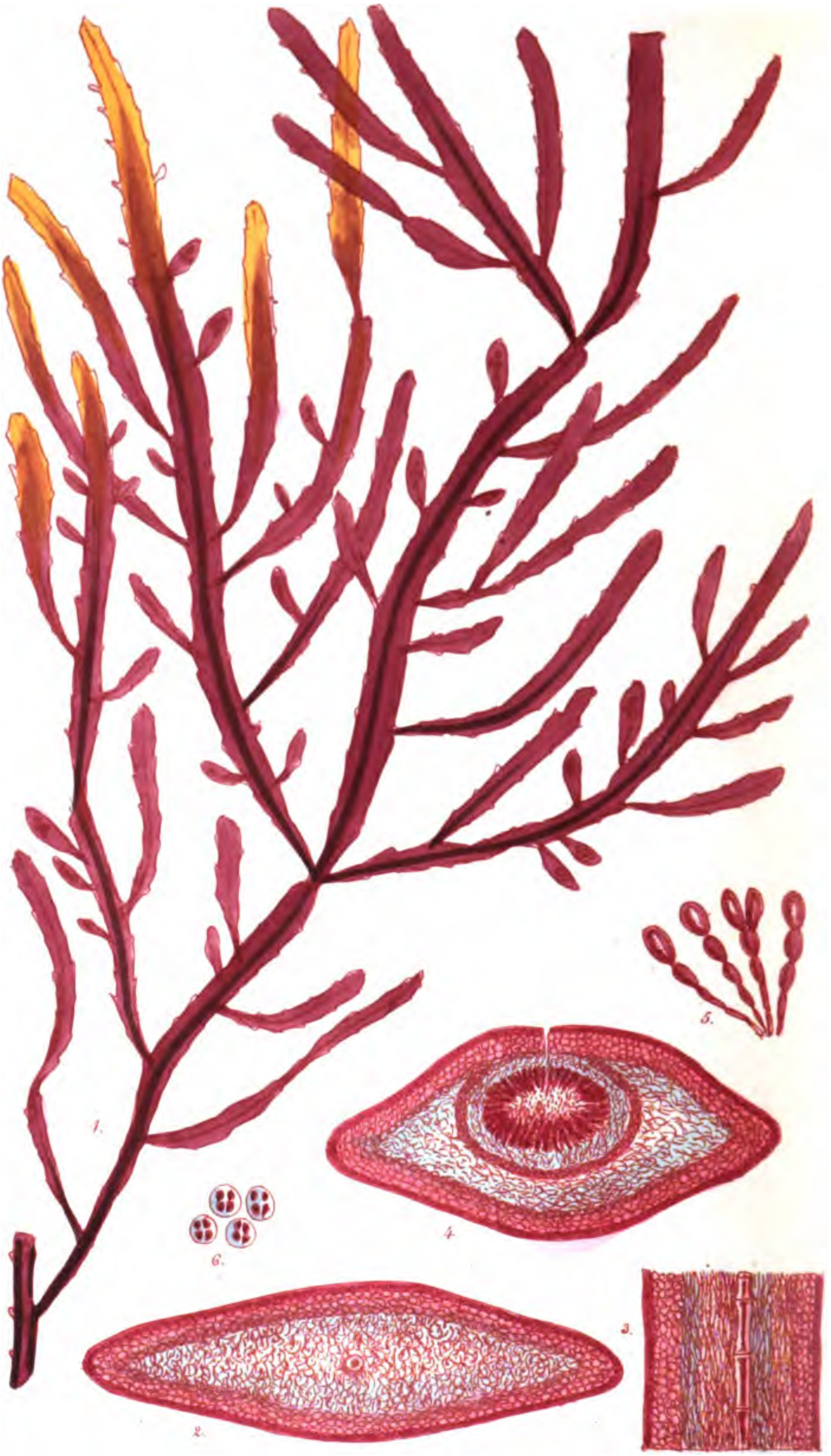
GEOGR. DISTR. West coast of Australia.

DESCR. *Root* a small disc. *Frond* 8–12–18 inches long, from half a line to a line in diameter, compressed, distichously much branched. *Branches* opposite, or, by occasional suppression, irregular, patent, 4–6 inches long, about half the diameter of the main stem at the point of their insertion, gradually attenuated upwards, and ending in a fine, hair-like point, not in the least constricted or narrowed at the base. These branches are set throughout, at short intervals, with opposite pairs of similar but smaller secondary branches, and these bear a third and fourth series, the last series being furnished with small, opposite, subulate ramuli. Ordinary specimens are about four times compound. A variety sometimes occurs, of rather stronger growth, but less repeatedly compounded, having its secondary branches nearly bare of ramuli, and drawn out into long, circinate points, sometimes passing into tendrils, and then clasping round any neighbouring object. The *cystocarps* have not yet been observed. *Stichidia* are common, and are found irregularly scattered over the branches and ramuli, springing either from disc or margin; they are subsessile, lanceolate, acute, and contain a single or double row of large tetraspores. The *substance* of the frond is softly cartilaginous, juicy and tender, at first somewhat crisp, but soon growing flaccid in the air, and in drying the plant closely adheres to paper. The *colour*, when growing, is a grey, or light greyish-fawn, reflecting prismatic tints; but it very soon assumes a bright rose-red in the air, or instantaneously if plunged into fresh-water, and this rosy colour is retained in the dried plant.

The genus *Sarcomenia*, Sond., was founded on a plant from Western Australia, at first sight very unlike the subject of the present Plate, but bearing a strong resemblance in habit to *Delesseria hypoglossum*. Having had opportunities of seeing both plants in a living state, I am more confident in referring them to the same genus. The substance of the frond is similar, and both are remarkable for a singularly rapid change of colour from an iridescent-grey or fawn to a rose-red, when removed from the sea or when thrown into fresh-water. So far as known, the fructification also agrees. The difference is thus reduced to one of habit, *S. hypneoides* being nearly cylindrical, while *S. delesserioides*, Sond., is foliaceous. But (as I hope to show in a future number) the frond in *S. delesserioides* varies greatly in breadth, and in some varieties is so very narrow as to become nearly filiform, and such specimens may be even confounded with our present plant. My first doubt, therefore, with the living plants before me was, not whether they were of different natural genera, but whether they were not extreme forms of one variable species!

Fig. 1. SARCOMENIA HYPNEOIDES,—*the natural size.* 2. A small branch, with ramuli and stichidia. 3. Longitudinal semi-section of the frond. 4. A transverse section. 5. A pair of stichidia:—the latter figures variously *magnified.*

Plate VIII



Vincent Brooks Imp

Ser. Rhodospermeæ. Fam. *Rhodymeniaceæ*.

Plate XIII.

ARESCHOUGIA AUSTRALIS, *Harv.*

Gen. Char. *Frond* linear, compressed, distichously branched, midribbed; composed of an articulated axial filament and three strata of cells; the *medullary* stratum consisting of longitudinal, anastomosing, interwoven filaments; the *intermediate* of several rows of roundish, coloured cells; the *cortical* of very minute, vertically seriated cellules. *Conceptacles* immersed in the frond, suspended among the filaments of the medullary stratum, and enclosed in a network of filaments, opening by an external pore, and containing moniliform strings of spores, radiating from a central placenta; *spores* roundish, seriated. —Areschougia (*Harv.*), in honour of Dr. J. E. Areschoug, Professor of Botany at Upsal, a distinguished algologist.

Frons linearis, compressa, distiche ramosissima, immerse costata, e filo centrali articulato et stratis tribus cellularum constituta. Stratum medullare e filis articulatis longitudinalibus anastomosantibus intertextis, intermedium e cellulis rotundis majusculis pluriseriatis, corticale e cellulis minimis verticalibus formatum. Cystocarpia fronde immersa, inter fila strati medullaris suspensa, reticulo filorum velata, carpostomio demum aperta, fila sporifera a placenta centrali emissa continentia. Sporæ subrotundæ, seriatæ.

Areschougia *australis;* stem terete at base, compressed and flattened upwards, then midribbed, laxly much branched; branches broadly linear, ligulate, elongate, distantly denticulate, alternately decompound; ramuli constricted at base, linear-oblong, subobtuse; conceptacles 2–5 together in the ultimate ramuli.

A. australis; *caule basi tereti, sursum compressa, tunc complanata et costata, laxe ramosissima; ramis late linearibus, ligulæformibus, elongatis, denticulatis, alterne decompositis; ramulis basi constrictis, lineari-oblongis, obtusiusculis; cystocarpiis* 2–5, *in ramulis immersis.*

Areschougia australis, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 554. *Harv. Alg. Austr. Exsic. n.* 384.

Halymenia australis, *Sond. Plant. Preiss. v.* 2. *p.* 173.

Phacelocarpus australis, *J. Ag. Sp. Alg. v.* 2. *p.* 649.

Euctenodus australis, *Kütz. Sp. p.* 770.

Hab. Shores of Western Australia, cast up from deep water. Abundant on the western shore of Rottnest Island, after storms, *W. H. H.* Fremantle, *Mr. Clifton.* Swan River, *Preiss, Mylne, etc.*

Geogr. Distr. As above.

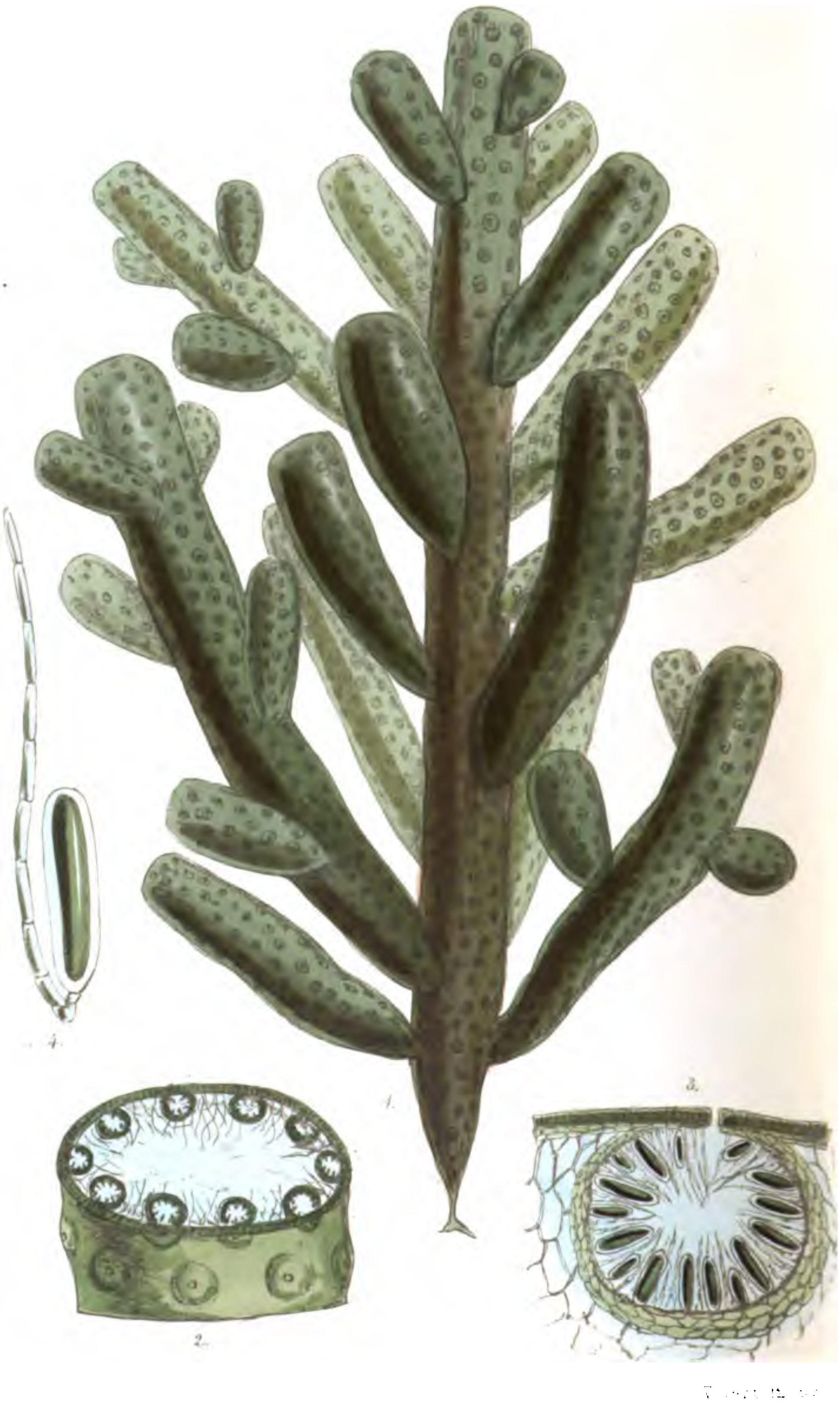
Descr. *Root* a thick, fleshy disc. *Frond* 2–3 feet long, 1–2 or 3 lines in breadth, preserving a nearly equal breadth throughout. Main *stem* cylindrical near the base, soon becoming compressed, and then flattened into a midribbed, strap-shaped frond, which is either once or twice forked, or else simple, and is throughout its length laxly set with distichous branches. These branches are flattened and midribbed like the stem, and are either entire at the edge or subdenticulate; they are 6–12–18 inches long, irregularly pinnated with alternate or scattered secondary branches; and the latter bear a third or fourth series of similar but smaller ramifications. All the lesser branches are much constricted at base, linear-strapshaped, and obtuse or subacute; the ultimate ramuli are scarcely an inch long, linear-oblong or somewhat lanceolate. The *substance* is firmly coriaceo-cartilaginous, pliant and tough when recent, horny when dry. The *conceptacles* are imbedded in the ultimate ramuli, three or four or more in each ramulus; a slight wartlike swelling, pierced with a pore, indicating the place of each. The sporular mass is suspended among the interwoven threads of the medullary stratum, and surrounded by a plexus of filaments; outside which, in some specimens (as in the one figured) there occurs a stratum of *pseudo-tetraspores* (?), or quadripartite, coloured cellules, which would pass for tetraspores if found on separate plants. The sporular nucleus is formed of radiating strings of spores, issuing from a central, cellular placenta. *Colour*, when growing, a clear, deep red, which becomes darker in drying, and fades, through orange and yellow, to creamy-white, after long exposure. The frond does not adhere to paper.

* * *

This handsome plant forms the type of a genus which I dedicated, in the herbarium, many years ago, to my friend Professor Areschoug of Upsal, but only published a character of it in 1855. Very recently, my friend Dr. Sonder, of Hamburg, has informed me that my "*Areschougia conferta, Alg. Austr. n.* 385" is identical with his "*Nizymenia australis, Linn. v.* 26, *p.* 521," a name published in 1853, and which had not reached me when my genus was established. But here a difficulty arises; for I find that I have distributed two plants under the MSS. name "*A. conferta;*" and had already discovered, and, as I supposed, corrected, the error in the (still unpublished) letterpress of the 'Flora of Tasmania,' by retaining some specimens to *A. conferta*, and naming the others "*Prionitis? rubra.*" It is possible that this latter may be the type of Sonder's *Nizymenia*. If so, the name *Areschougia* will stand at least for the present plant and for *A. Laurencia*. The genus appears to me to be nearly allied to *Rhabdonia*, from which it is readily known by the articulated monosiphonous axis. The structure of the frond is similar to that of *Phacelocarpus*, but the fructification very different.

Fig. 1. ARESCHOUGIA AUSTRALIS,—portion of a frond, of the *natural size*. 2. Cross section through an old stem. 3. Longitudinal section of the same. 4. Cross section of a fertile ramulus, through one of its conceptacles, which is surrounded by a band of *pseudo-tetraspores*. 5. Strings of *spores*, from the nucleus. 6. *Pseudo-tetraspores*:—the latter figures variously *magnified*.

Plate [illegible]



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Ser. Melanospermeæ. Fam. *Fucaceæ.*

Plate XIV.

SPLACHNIDIUM RUGOSUM, *Grev.*

Gen. Char. *Root* discoid. *Frond* without distinct organs, cylindrical, proliferously branched; branches saccate, filled with slimy gelatine, the cortical stratum thin and membranous. *Spore-cavities* scattered over the whole frond, attached to the inner surface of the cortical stratum, and communicating with the surface through a pore, diœcious. *Spores* linear-oblong, subsessile. *Paranemata* simple. —Splachnidium (*Grev.*), from *σπλαγχνον, bowel* or *gut.*

Radix discoidea. Frons, organis nullis discretis, cylindracea, prolifera; ramis saccatis, intra stratum corticale membranaceum succo mucoso repletis. Scaphidia per totam frondem sparsa, infra stratum corticale appensa, cum ostiolo superficiali per canalem communicantia, dioica. Sporæ oblongo-lineares, subsessiles. Paranemata simplicia.

Splachnidium *rugosum,* Grev.

Splachnidium rugosum, *Grev. Syn. p. xxxvi. Harv. Gen. S. A. Pl. p.* 394. *Endl. 3rd Suppl. p.* 29. *Kütz. Phyc. Gen. p.* 350. *Hook. and Harv. Fl. Nov. Zeal. v.* 2. *p.* 215. *J. Ag. Sp. Alg. v.* 1. *p.* 186. *Kütz. Sp. Alg. p.* 585. *Harv. Alg. Austr. Exsicc. n.* 45.

Dumontia rugosa, *Suhr, Beitr.* 1840, *p.* 275.

Fucus rugosus, *Linn. Mant. p.* 311. *Turn. Hist. t.* 185. *Ag. Sp. p.* 100. *Ag. Syst. p.* 280. *A. Rich. Fl. Nov. Zeal. p.* 141.

Hab. On rocks, near low-water mark. Port Phillip Heads, Victoria; and at Newcastle, N.S. Wales, *W. H. H.* Georgetown, Tasmania, *Mr. Gunn.*

Geogr. Distr. Cape of Good Hope!, New Zealand!, Indian Ocean (*fide J. Ag.*).

Descr. *Root* a small, conical disc. *Fronds* one or several from the same base, 4–8 inches long; the main frond quite simple, linear-clubshaped, tapering to the base, cylindrical for the greater portion of its length, and truncate at the extremity, furnished throughout its length with lateral *branches* or secondary fronds similar in all respects to the primary, and springing proliferously from its sides. These branches are constricted at base, bag-like and truncate at the extremity, and in luxuriant specimens emit tertiary bag-like ramuli. The bag-like fronds and branches have a thin, coriaceo-membranous periphery or cortical stratum, beneath which is a large plexus of interwoven longitudinal and transverse filaments, and the whole cavity is filled with transparent, slimy jelly, through which a few filaments extend. There are neither *vesicles* nor proper *receptacles.* The *spore-cavities* are thickly scattered over every part of the frond, one being seated beneath each of the mammæform pores which dot the whole surface; they are

suspended amid the jelly, but attached to the inner side of the cortical stratum by a plexus of filaments, and contain very narrow, linear-oblong spores, surrounded by simple paranemata. *Antheridia* not observed. The *colour*, when young, is a pale greenish-olive, in age changing to brown, which is also the colour of the dried plant. Owing to its gelatinous contents, the frond, if pressed, adheres closely to paper in drying.

The present is one of those Fucoid genera which have no distinct organs, the whole plant being referable either to "*receptacle*" or to "*frond*," according to the fancy of the describer. Every portion produces abundance of spore-cavities, and any branch, if compared with the receptacle of a *Fucus*, will be found to have an essentially similar structure.

Splachnidium rugosum has a much wider geographical range than most of the other Southern Fucoids, and is the only one found at the Cape of Good Hope, as well as in Australia. The "Indian Ocean" locality is derived from an old herbarium, and requires confirmation.

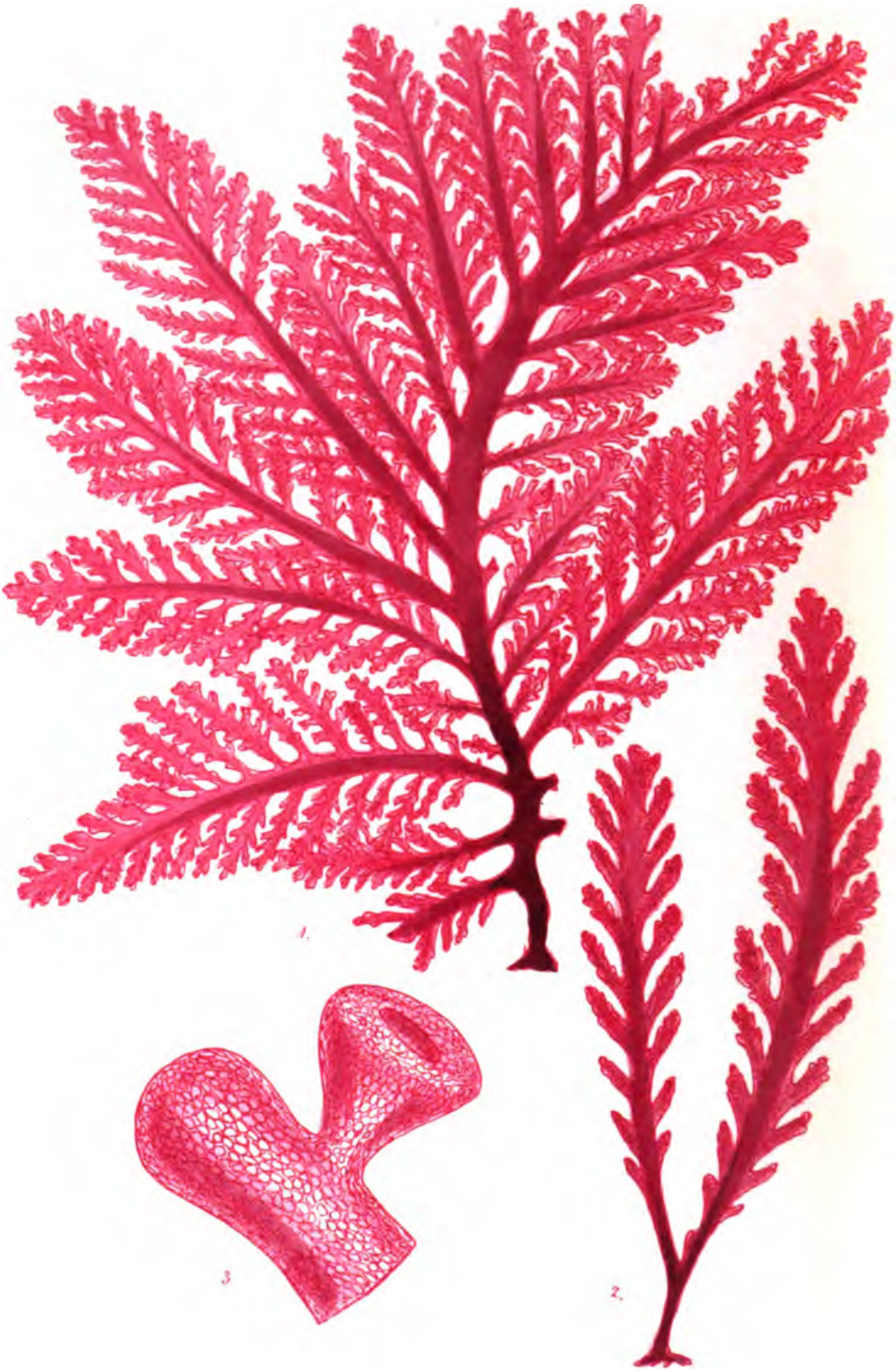
Our figure represents the common form, as it appears before having been dried. In drying it becomes much darker, and wrinkled,—whence the name "*rugosum*" given by Linnæus, and very applicable to the specimens to be found in old herbaria, one of which is figured in Turner's plate. There is no trace of rugosity in the growing plant, which is plump and full of juice.

A small variety, scarcely one-third or one-fourth the size of our plant, sometimes occurs. I gathered such abundantly at Newcastle, N. S. Wales, and have also received it from New Zealand. It is only distinguishable from the common form by its size and narrow branches.

As a genus, *Splachnidium* ranks next to *Notheia*, which differs in its parasitic growth and solid frond.

Fig. 1. SPLACHNIDIUM RUGOSUM,—*the natural size*. 2. Cross section of the frond, showing spore-cavities imbedded in the gelatinous substance, and attached to the walls. 3. Section of a spore-cavity. 4. A spore and paranema:—the latter figures variously *magnified*.

Plate XV.



Vincent Brooks

PLATE XV.

LAURENCIA GREVILLEANA, *Harv.*

GEN. CHAR. *Frond* cylindrical or plano-compressed, linear, pinnately-branched, cartilaginous, the apices obtuse, composed of two strata of cells; the *inner* of oblong, angular cells, shorter toward the circumference; the *outer* of small, roundish-angular cellules. *Fruit:* 1, ovate, sessile *ceramidia*, containing a tuft of pear-shaped spores; 2, tripartite *tetraspores*, imbedded, without order, beneath the tips of the ramuli.—LAURENCIA (*Lamour.*), in honour of M. De la Laurencie, a French naturalist.

Frons teretiuscula v. plano-compressa, linearis, pinnato-ramosa, cartilaginea, apicibus obtusis, ex stratis duobus contexta; strato medullari ex cellulis oblongis extus sensim brevioribus, corticali ex cellulis minoribus rotundo-angulatis coloratis. Fruct.: 1, *ceramidia ovata, sessilia, intra pericarpium crassiusculum fasciculum sporarum pyriformium foventia;* 2, *tetrasporæ triangule divisæ, infra apicem ramulorum sine ordine immersæ.*

LAURENCIA *Grevilleana;* deep rosy-crimson; frond flat, exactly distichous, decompound-pinnate; pinnæ alternate, erecto-patent, on a straight rachis; pinnules oblong, inciso-crenate or pinnatifid, the lowest ones minute, gland-like; fruit?

L. Grevilleana; *purpureo-coccinea; fronde complanata eximie disticha decomposito-pinnata; pinnis in rachide stricta alternis erecto-patentibus; pinnulis oblongis inciso-crenatis v. pinnatifidis, inferioribus minutis glandulæformibus; fructiferis?*

LAURENCIA Grevilleana, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 545. *Harv. Alg. Austr. Exsic. n.* 227.

HAB. On the under surface of ledges of the coral-limestone reefs at Rottnest Island, Western Australia, at extreme low-water mark, *W. H. H.*

GEOGR. DISTR. As above.

DESCR. *Root* a spreading, lobed disc. *Fronds* tufted, 6–8 inches long, 2–3 lines in diameter; the lower part of the principal stem thickened in the middle, the upper part and all the branches and their divisions quite flat, thickish. The ramification is perfectly distichous, of a pinnate character, and full-grown specimens are about thrice pinnated, the ultimate pinnules being either denticulate or more or less pinnatifid. The main rachis is usually quite simple, but sometimes is once or twice forked; the pinnæ and their subdivisions are alternate, and issue at an angle of 30° to 45°. All the sinuses or axils of the ramifications are obtuse. Some specimens occur of half the breadth above stated, but do not otherwise differ. The young frond (Fig. 2) is simply pinnatifid. The *substance* is soft, carnoso-cartilaginous or somewhat membranaceous, and in drying the plant adheres closely to paper, and has a glossy surface. The *colour*, when growing, is a beautifully clear rosy-carmine, which becomes rather darker and duller in dying. No fructification has yet been observed. On one or two specimens, obconical, perforated ramuli, destined probably to contain *antheridia*, occur.

This very handsome species is inscribed to Dr. R. K. Greville, of Edinburgh, to whose 'Algæ Britannicæ' the Author is indebted for his earliest knowledge of the Algæ; and who is particularly deserving of having a *Laurencia* dedicated to him, as he first reformed, on correct principles, the genus so called, and which had previously contained many heterogeneous species.

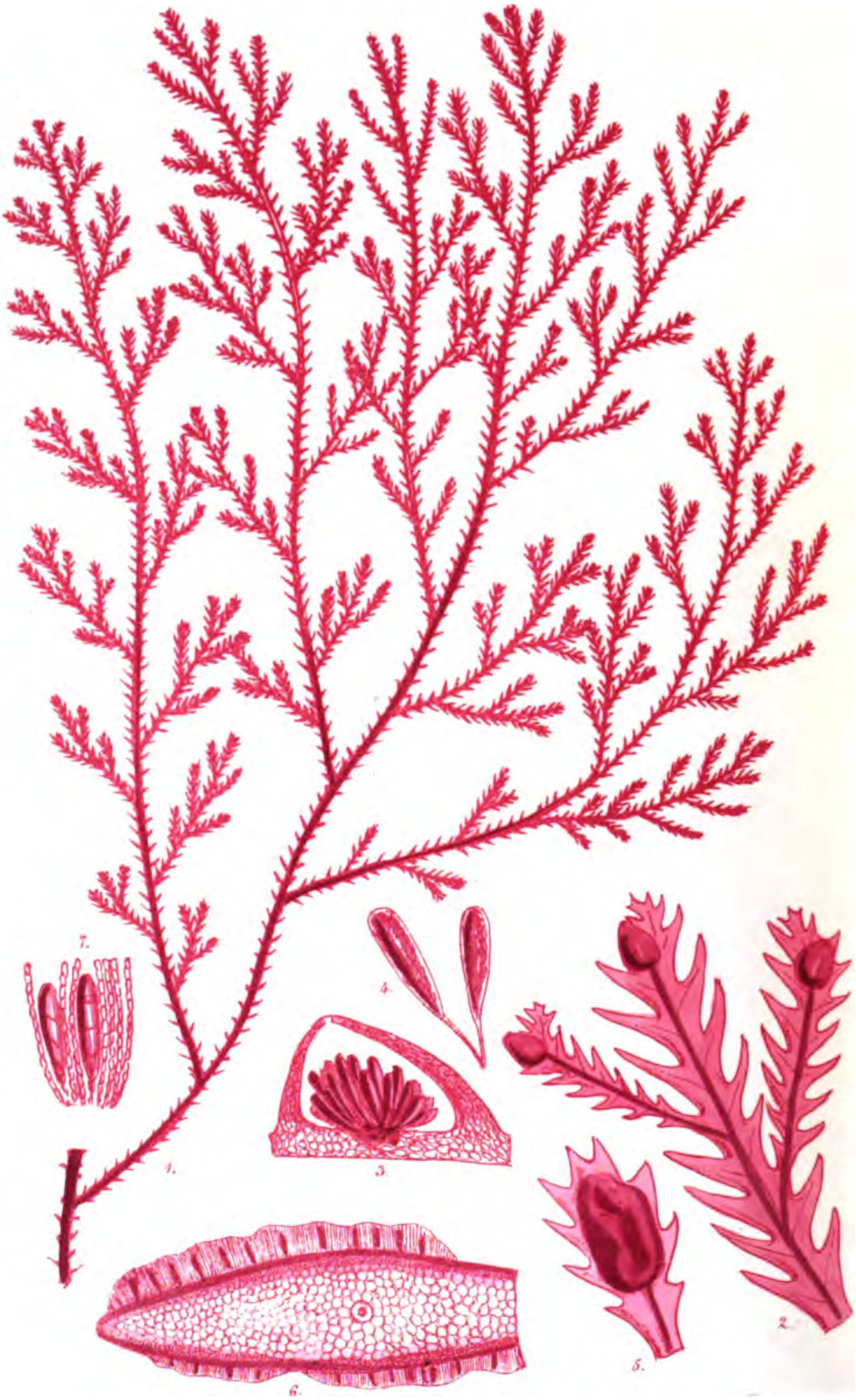
Our plant, in its ramification, greatly resembles the common *L. pinnatifida* of the Northern Hemisphere; but it differs so remarkably in colour,—a character of greater moment among the Algæ than among any other class of plants,—that no algologist, we feel convinced, would refer it to that species. It may be however regarded as the Australian representative of *L. pinnatifida.*

From *L. concinna*, Mont. (*L. complanata*, Suhr), the only southern species with which it can be confounded, it differs by its alternate, not opposite ramification.

The fructification has not yet been seen. On one or two specimens I have found young "*saucers*," like those that produce *antheridia* in *L. pinnatifida*, but the antheridia had not been developed.

Fig. 1. LAURENCIA GREVILLEANA, a full-grown specimen; and 2, a young specimen:—both of the *natural size*. 3. Apex of an ordinary ramulus, bearing a top-shaped ramulus, probably a receptacle for antheridia:—moderately *magnified*.

Plate XVI



Vincent Brooks Imp.

Ser. RHODOSPERMEÆ. Fam. *Laurenciaceæ.*

PLATE XVI.

DELISEA PULCHRA, *Mont.*

GEN. CHAR. *Frond* linear, compressed, two-edged, alternately decompound, distichous, the branches and ramuli pectinato-serrate, with an immersed costa, and central articulated filament; medullary stratum composed of roundish-angular, closely-packed cells; cortical, of very minute, coloured cellules in several rows. *Fruit:* 1, obliquely ovate *ceramidia,* sessile on the midrib, near the summit of the branches, containing a tuft of pear-shaped spores; 2, zonate *tetraspores* immersed in wartlike swellings (*nemathecia*) of the apices.—DELISEA (*Lamour.*), in honour of M. Delise, a French naturalist.

Frons linearis, compresso-anceps, alterne decomposita, disticha, ramis ramulisque argute pectinato-serratis, plus minus conspicue costata, filo centrali articulato percursa; strato medullari ex cellulis magnis rotundato-angulatis hyalinis, corticali ex cellulis minutis pluriserialibus coloratis formato. Fruct.: 1, *ceramidia ovata ad costam prope apices ramorum sessilia, intra pericarpium cellulosum sporas oblongo-pyriformes longe pedicellatas foventia;* 2, *tetrasporæ zonatim divisæ in verrucis apices ramulorum investientibus evolutæ.*

DELISEA (Calocladia) *pulchra;* frond near the base subterete or compressed, flat and midribbed upwards, decompound-pinnate; pinnæ virgate, alternate, once or twice compound; marginal teeth subulate, rather longer than the breadth of the rachis; conceptacles subterminal, their apex pointing upwards.

D. pulchra; *fronde basi incrassata subterete cartilaginea supra applanata costataque decomposite pinnata, pinnis virgatis alternis sub-bipinnulatis; dentibus marginalibus latitudinem rachidis superantibus subulatis; cystocarpiis ad apices pinnularum in pagina plana sessilibus erectiusculis.*

DELISEA pulchra, *Mont. in An. Sc. Nat. ser.* 3. *v.* 1. *p.* 158. *Hook. fil. et Harv. Fl. Ant. v.* 2. *p.* 484 (*excl. syn.*). *Harv. Ner. Aust. p.* 89. *t.* 34. *Kütz. Sp. Alg. p.* 770. *J. Ag. Sp. Alg. v.* 2. *p.* 784. *Harv. Alg. Exsic. Aust. n.* 246.

BOWIESIA pulchra, *Grev. Alg. Brit. Syn. p.* 57.

CALOCLADIA pulcha, *Grev. in Lindl. Introd. ed.* 2. *p.* 436.

BONNEMAISONIA pulchra, *Endl. 3rd. Suppl. p.* 44.

HAB. New Holland, *Frazer.* Western Australia, rare, *W. H. H.* Abundant on the coast of New South Wales, at Newcastle, and Kiama, *W. H. H.* Tasmania, *Herb. Paris.* Port Arthur, *W. H. H.*

GEOGR. DISTR. Western and eastern shores of Australia. Southern shore of Tasmania. Kerguelen's Land, *Dr. Hooker!*

Descr. *Root* a broad, fleshy disc. *Fronds* mostly solitary, 12–18 inches in length. The lower part of the frond, in old specimens, becomes gradually thickened into a stem, which is at first compressed, and bordered with a narrow wing, and afterwards is terete, without margin or marginal teeth. Upwards this stem gradually passes into the flat, narrow-linear, costate, simple or forked principal-rachis of a repeatedly decompound frond. The branches and all their divisions are alternate, and distichous, and more or less pinnated; but the ramification is very unequal, long and short ramuli often alternating without order. In some specimens the larger branches are naked below, but closely and somewhat flabellately pinnate above. The branches are uniformly about a line in diameter. All the younger ones are closely serrated with alternate, subulate, erecto-patent teeth, somewhat longer than the breadth of the branch. The *conceptacles* are borne just below the extremities of the ramuli, and are seated on the flat surface, their base coinciding with the apex of the midrib; they are obliquely ovate, and have a terminal pore pointing upwards. The warts in which the tetraspores are imbedded are of irregular form, and developed in dilated apices of the ramuli, being prominent towards both surfaces; the *tetraspores* are fusiform, and stand vertically in the wart. The *colour* is a dark blood-red, soon fading in fresh-water. The *substance* is firmly cartilaginous, and the plant very imperfectly adheres to paper in drying.

Of the genus *Delisea*, six species are now known, five of which are Australian, and one South African. These are placed by J. Agardh under three subgenera, distinguished by some differences in the structure of the frond, and the position and structure of the conceptacles. All agree in general aspect. The present belongs to the subgenus *Calocladia*.

The "*type of form*" to which these plants belong is found in several other Australian Algæ of very different affinities. The genus *Phacelocarpus*, founded on "*Fucus Labillardieri*" of Turner, is one of the best-known examples of this type; and more than one species of *Ptilota* (*Pt. siliculosa*, *Pt. striata*, and *Pt. rhodocallis*) are also referable to it. Some of these plants are externally so similar to each other, that, although by their fructification they are placed in widely separated genera, yet it requires a sharp eye to distinguish them, without reference to the fruit. Students must bear this in mind when using the Plates here given.

Fig. 1. Delisea pulchra,—*the natural size.* 2. Pinnules with conceptacles at their apices. 3. Vertical section of a conceptacle. 4. Spores from the same. 5. Apex of a ramulus, with a wart (*nemathecium*). 6. Cross section through the same, showing the structure of the frond, and the external growth of the wart. 7. Tetraspores and paranemata from the same:—the latter figures variously *magnified.*

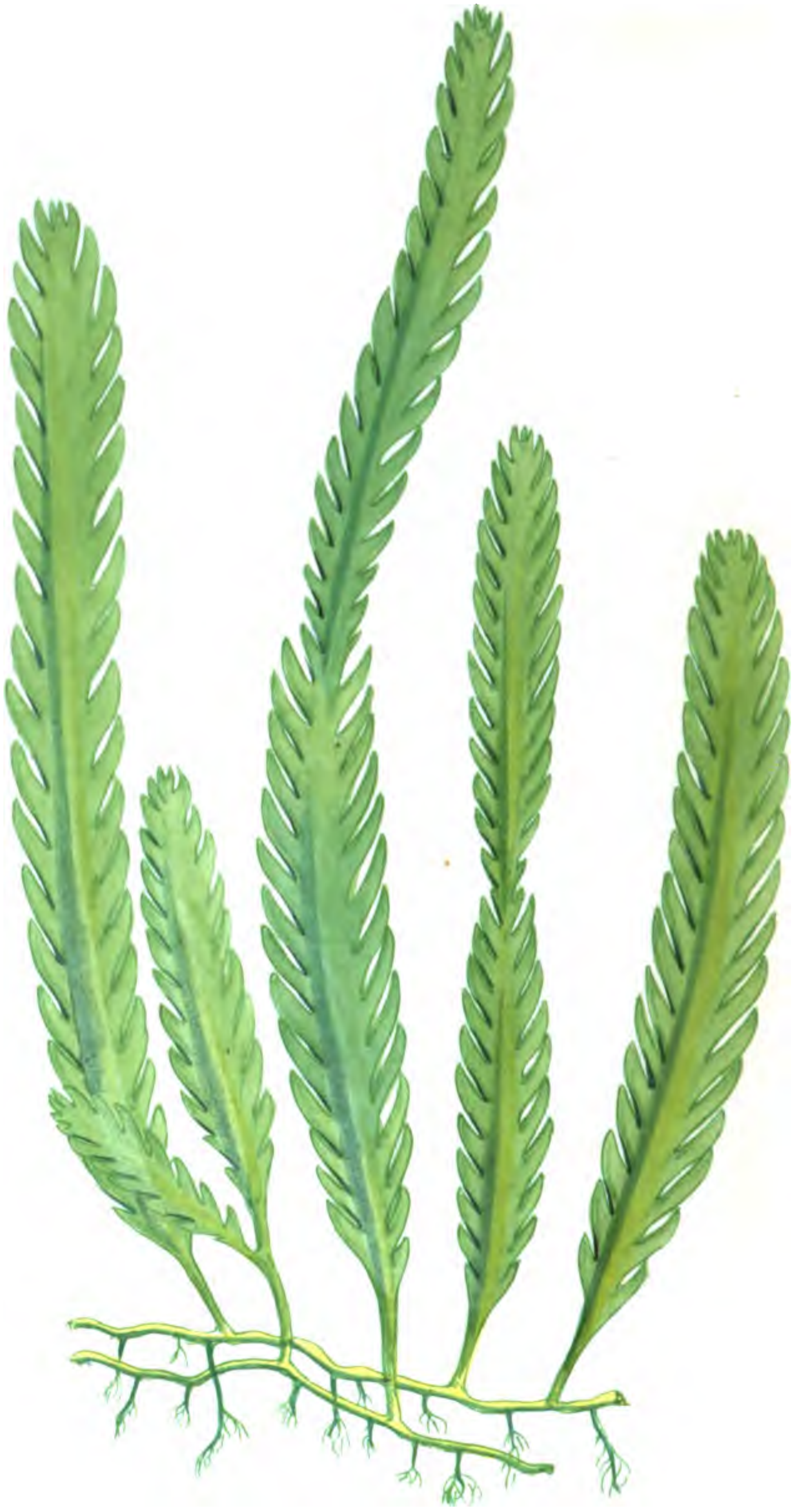


PLATE XVII.

CAULERPA SCALPELLIFORMIS, *Ag.*

GEN. CHAR. *Frond* consisting of prostrate *surculi* rooting from their lower surface and throwing up erect branches, or secondary fronds, of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semifluid, grumous matter. *Fructification* unknown.—CAULERPA (*Lamour.*), from *καυλος, a stem,* and *ἑρπω, to creep.*

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membranâ continuâ hyalinâ intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fr. ignota.

CAULERPA *scalpelliformis;* surculus slender, glabrous; frond erect, shortly stipitate, linear-lanceolate, inciso-pinnatifid; rachis broad and flattish; pinnæ alternate, knife-shaped, subacute, incurved.

C. scalpelliformis; *surculo gracili glabro; fronde erecta breve stipitata lineari-lanceolata inciso-pinnatifida; jugamento lato applanato; pinnis cultriformibus alternis subacutis apice incurvis.*

CAULERPA scalpelliformis, *Ag. Sp. Alg. v.* 1. *p.* 437. *Ag. Syst. p.* 181. *Kütz. Sp. Alg. p.* 496. *Endl.* 3*rd Suppl. p.* 16. *Harv. Alg. Exsic. Austr. n.* 549.

FUCUS scalpelliformis, *R. Br. in Turn. Hist. t.* 174.

HAB. On rocks, just below low-water mark. Rottnest Island and King George's Sound, West Australia. Fremantle, *Mr. Clifton.* Port Phillip, *W. H. H.* South Australia, *Dr. Mueller* and *Dr. Curdie.* Sealer's Cove, Gipps Land, *Dr. Mueller.* In the Tamar, V.D.L., *Mr. Henty.*

GEOGR. DISTR. West and south shores of Australia. Indian Ocean, at Madras, *Dr. Wight!* Yemen, *Herb. Mont.!*

DESCR. *Surculi* 3–6 inches long, half a line to a line in diameter, simple or slightly branched, rooting at subdistant intervals, quite glabrous, glossy, shrinking, and often furrowed when dry. *Fronds* several from each surculus, erect, half an inch to an inch apart, 4–12 inches long, about half an inch or rather more in width, linear-lanceolate in outline, sometimes constricted in the middle, terminating a *stipes* of half an inch to an inch in length; simple, or rarely forked. Each frond consists of a broad, thickened *rachis,* 2–3 lines wide, closely pectinato-pinnated with alternate, linear, incurved, subacute, plano-compressed, two-edged, knife-like ramenta 2–4 lines long, and about a line in width, issuing at an acute angle, the axils also being acute. *Substance* flaccid when recent, horny-membranous and glossy when dry. *Colour*, when growing, a bright yellowish-green, becoming more or less olive in the herbarium. The structure within the external membrane is spongy, as in others of the genus, and the contents an unctuous, deep green fluid.

The species of the genus *Caulerpa* are pre-eminent among the Green Algæ, and the present is one of the most elegant of the Australian kinds. Its Fern-like fronds are produced generally on perpendicular rocks, a few feet below low-water mark, and its surculi spread in wide patches. No other Australian species nearly resembles it, but it is closely related to *C. denticulata*, Dne., a native of the Red Sea, and somewhat less closely to *C. mexicana*, Sond., a West Indian species, and to *C. asplenioides*, Grev., from the East Indies. The specimens distributed by Dr. Wight (n. 151) are referred by Dr. Greville and myself to the true *C. scalpelliformis;* but I have received from Dr. Montagne a specimen from Yemen, identical with Dr. Wight's, under the name "*C. denticulata*," Dne. It is not, however, *denticulate*, nor does it agree in other respects with Decaisne's specimens, admirably represented in that author's figure, and I have therefore transferred it to the present species.

The frond, after having been dried, is hygrometric, and if moistened slightly on one side, will curl up like the sensitive-fish-toys made out of horn shavings. This property was first pointed out to me by Mr. Henty, of Georgetown, Tasmania, who showed it to me as a sort of "marine Sensitive-plant." His specimens were, I believe, obtained by dredging in deep water.

Fig. 1. CAULERPA SCALPELLIFORMIS,—*the natural size.*

PLATE XVIII.

GELIDIUM GLANDULÆFOLIUM,

Hook. fil. et Harv.

GEN. CHAR. *Frond* firmly cartilaginous, linear, compressed, decompound-pinnate, composed of three strata; the *medullary* stratum of densely packed, interwoven, longitudinal filaments; the *intermediate* of polygonal cells; the *cortical* of minute, coloured cellules arranged in horizontal, moniliform series. *Fruct.:* 1, bilocular *conceptacles* immersed in the ramuli, containing, within a thick pericarp, pedicellate, pear-shaped spores, dispersed over both surfaces of a medial dissepiment, which is united to the pericarp by slender filaments; 2, cruciate *tetraspores,* forming sori in dilated ramuli.—GELIDIUM (*Lam.*), from *gelu,* frost, whence also *gelatine;* but none of the species are gelatinous.

Frons corneo-cartilaginea, linearis, anceps, pinnatim decomposita, tribus stratis cellularum contexta; medullari ex filis tenuibus intertextis longitudinalibus, intermedio ex cellulis polygonis, corticali ex cellulis minutis coloratis in fila horizontalia brevissima seriatis composito. Fruct.: 1, *cystocarpia bilocularia in ramulis immersa, ad dissepimentum longitudinale filis tenuibus cum pericarpio crasso junctum, sporas subpyriformes sparsas pedicellatas foventia.*

GELIDIUM *glandulæfolium;* root branching; frond very narrow, two-edged, tall, distantly bi-tripinnate; pinnæ few, opposite, naked at base, oppositely or fasciculately pinnulate above; pinnules very long, filiform, simple or forked; fructiferous ramuli minute, setiform or glandular, in some specimens containing conceptacles, in others tetraspores.

G. glandulæfolium; *radice ramosa; fronde angustissima ancipiti elata plus minus bi-tripinnata; pinnis paucis oppositis basi longe nudis supra opposite v. fasciculatim pinnulatis; pinnulis longissimis filiformibus simplicibus furcatisve; ramulis fertilibus minutis setiformibus, nunc cystocarpia, nunc tetrasporas foventiis.*

GELIDIUM glandulæfolium, *Hook. fil. et Harv. in Hook. Lond. Journ. v.* 6. *p.* 406. *Kütz. Sp. Alg. p.* 766. *J. Ag. Sp. Alg. v.* 2. *p.* 474. *Harv. Alg. Exsic. Austr. n.* 335.

HAB. Thrown up from deep water. Discovered at Circular Head, Tasmania, by *Mrs. Smith.* South Australia, *Dr. Curdie.* Port Fairy, Victoria, *W. H. H.* Coast of Victoria, *Dr. Mueller.* South Port, V.D.L., *Mr. C. Stuart.*

GEOGR. DISTR. South coast of New Holland. Tasmania.

DESCR. *Root* branching, matted. *Fronds* densely tufted, 12–14 inches long or more, about ½ line in breadth, everywhere preserving nearly the same width, compressed, two-edged, simple or forked, naked below, decompound-pinnate above. *Pinnæ* opposite or alternate, sub-horizontally patent, 6–8 inches long, the pairs distant or crowded, sometimes fasciculate, naked in their lower half, more or less regularly pinnulated above the middle. The *pinnules*, like the pinnæ, are normally opposite, but are irregularly suppressed, often scattered, and nearly as often crowded about the summits or fasciculate; they are filiform, slightly attenuated towards the point, one or two inches long, very patent, simple or forked. In fertile specimens the pinnules are thickly fringed with minute, horizontal ramuli, less than a line in length, at first filiform, afterwards changing in shape according to the sort of fructification they bear. Those that are to enclose *conceptacles* become lanceolate, acuminate to a sharp point, and the conceptacle is lodged in their middle, and prominent to both surfaces. Those that bear *tetraspores* are spathulate and obtuse, having a cluster of tetraspores in the widened part. The *colour* is a dark purplish-red, becoming brighter after long immersion in fresh-water, and fading, through scarlet and orange, to cream-white on exposure. The *substance* is very tough, becoming rigid and horny when dry, in which state the plant does not adhere to paper.

Not an uncommon species on the coast of Victoria and the northern shores of Tasmania; and among the larger species of the genus. Whether it be distinct from the true *G. asperum*, Mert., as described by J. Agardh, appears doubtful; but it is very different from the plant distributed in my Alg. Aust. Exsic. under that name. The latter approaches *G. corneum;* perhaps too nearly. I have never seen authentically marked specimens of *G. asperum*, Mert.

Our *G. glandulæfolium* varies greatly in ramification, being sometimes nearly naked, and sometimes regularly pinnated. The specimen figured may be regarded as a fair example of the typical form.

G. corneum, in three or four of its recognized varieties, occurs on various parts of the Australian coast, but being a well-known plant of cosmopolitan distribution, will not be figured in the present work.

Fig. 1. GELIDIUM GLANDULÆFOLIUM,—*the natural size*. 2. Part of a pinnule, with *conceptacles* in the bristle-shaped ramuli. 3. A section of a conceptacle, showing the spores attached to the medial dissepiment. 4. Part of a ramulus, with *tetraspores* immersed in the dilated ramuli. 5. A ramulus, with its *sorus* of tetraspores. 6. Tetraspores from the same:—the latter figures more or less *magnified*.

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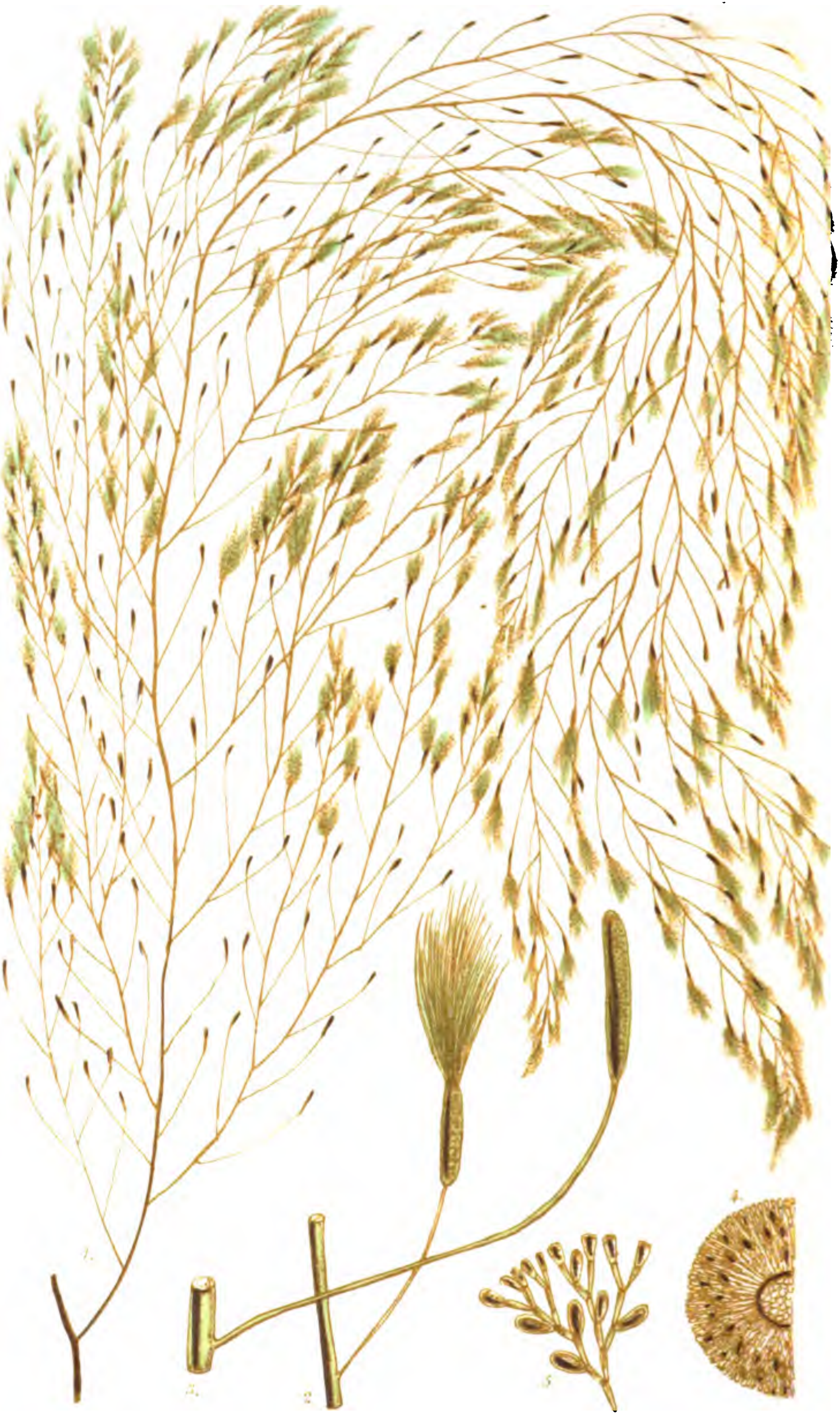


Vincent Brooks Imp.

PLATE XIX.

SPOROCHNUS MOOREI, *Harv.*

GEN. CHAR. *Frond* filiform, solid, pinnately decompound. *Receptacles* pod-shaped, pedicellate, crowned with a tuft of soft hairs, and densely covered with whorled, branching, sporiferous filaments. *Spores* obovoid, attached to the sides of the filaments.—SPOROCHNUS (*Ag.*), from *σπορος, a seed,* and *χνοος, wool,* because tufts of soft hairs crown the fructification.

Frons filiformis, solida, pinnatim ramosa. Receptacula siliquæformia, pedicellata, apice comosa, paranematibus ramosis horizontalibus verticillatis densissime vestita. Sporæ obovoideæ, ad paranemata laterales.

SPOROCHNUS *Moorei;* frond filiform, slender, repeatedly decompound; receptacles cylindrical, on pedicels many (4–8 or more) times their own length.

S. Moorei; *fronde tenui ramosissima; receptaculis cylindraceis pedicello filiformi multiplo* (4–8-*plo*) *brevioribus.*

SPOROCHNUS Moorei, *Harv. Alg. Exsic. Austr. n.* 51.

HAB. Dredged in Paramatta River, Sydney, *Charles Moore, Esq.; W.H.H.*

GEOGR. DISTR. Only known in one locality, but there abundant in May and June.

DESCR. *Root* a small disc. *Fronds* 2–3 feet long or more, scarcely thicker than hog's-bristle, cylindrical, glabrous, very much branched; the branches alternate, 1–2 feet long, and once or twice alternately decompound. The lesser branches and their subdivisions are subdistant, and very unequal in length, and the habit of the frond is singularly lax and slender. The *receptacles* are exactly linear, obtuse at each end, cylindrical, one to two lines in length, and borne on filiform pedicels, which, when full-grown, are often more than an inch in length. In the young plant (as in all the genus) the tips of the branches and of the receptacles are crowned with a dense tuft of soft, articulated hairs. The axis of the receptacle is densely cellular; its paranemata are irregularly dichotomous, their terminal cellules clavate; and they bear laterally numerous small oblong spores. *Colour,* when recent, a pale tawny-olive, becoming greener in fresh-water and in drying. *Substance,* when young, soft and closely adhering to paper; horny, when old.

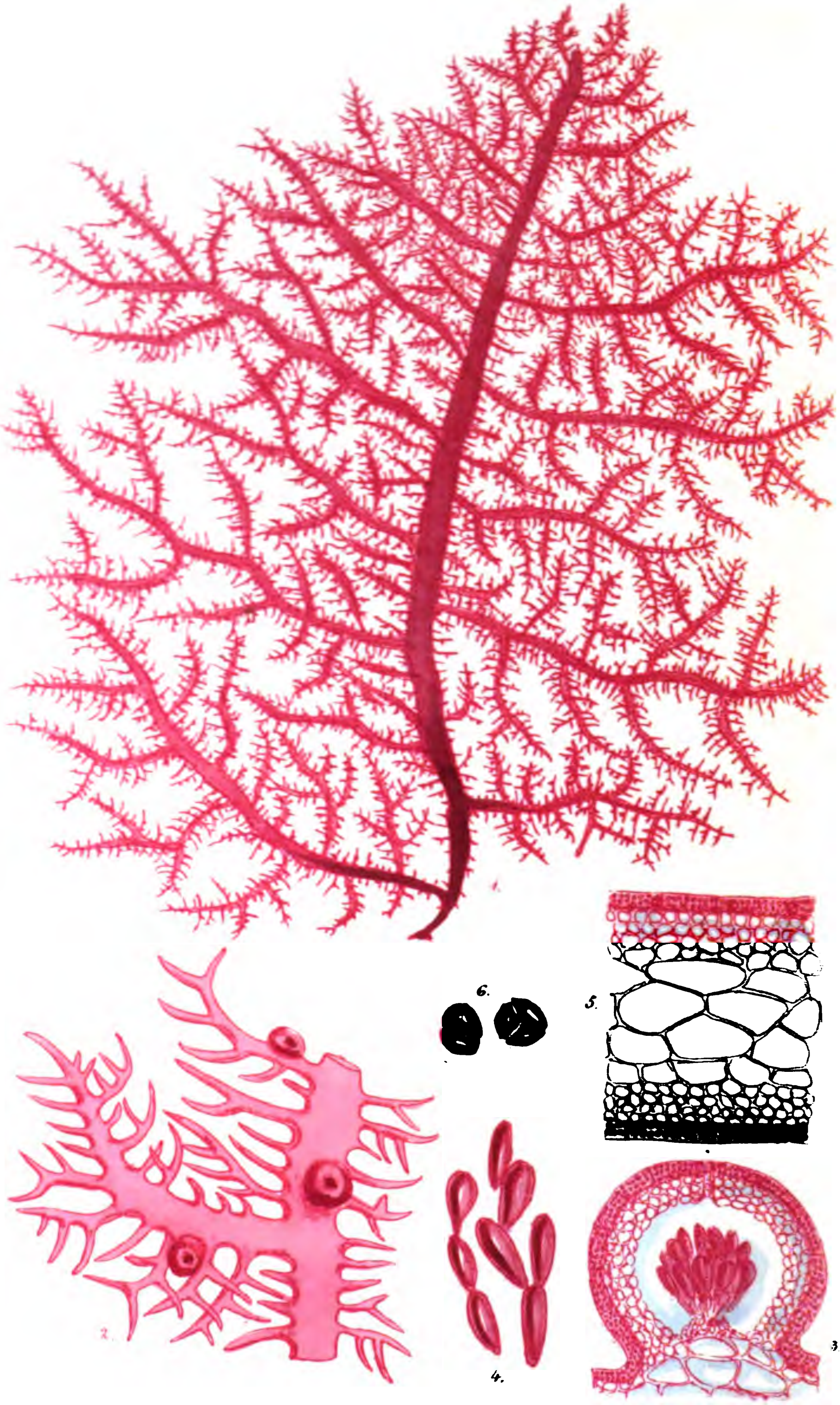
The Australian *Nereis* is rich in species of *Sporochnus,* and the plant here figured is one of the most distinctly characterized. It differs from every known species in the very great length of the pedicels, combined with the cylindrical, exactly linear fruit. *S. radiciformis* alone approaches it in the length of the pedicel, but differs completely in the form of the fruit, which in that species is globose.

S. Moorei was discovered by Charles Moore, Esq., the able curator of the Sydney Botanic Gardens, and deservedly bears his name. It is the only species hitherto found at Port Jackson, and is abundant toward the eastern end of Spectacle Island, in the same locality where *Claudea Bennettiana*, the rarest of Australian Algæ, was once dredged.

Like all others of the genus, it rapidly becomes flaccid and changes colour when exposed to the air. When growing in a strong current, its branches are very much drawn out, and less crowded than is represented in our figure.

Fig. 1. SPOROCHNUS MOOREI; a branch,—*of the natural size.* 2. A young receptacle; and 3, one further advanced. 4. Transverse semi-section of a receptacle. 5. A *paranema* or spore-filament from the same, bearing spores:—the latter figures *magnified.*

Plate XI.



Vincent Brooks Imp.

PLATE XX.

HYMENOCLADIA DIVARICATA, *Harv.*

GEN. CHAR. *Frond* softly membranaceous, flat, linear, distichous, decompoundly pinnated, composed of three strata of cells; the *medullary* of large, roundish, inflated cells; the *intermediate* of smaller, angular cells; the *cortical* of minute, coloured cellules, arranged in vertical, moniliform series. *Fruct.:* 1, *conceptacles* globose, sessile, with a thick, cellular pericarp, at length opening by an apical pore; *spore-threads* moniliform, attached to a basal placenta, the spores elliptic-oblong; 2, dispersed, tripartite *tetraspores.*—HYMENOCLADIA (*J. Ag.*), from *ὑμην, a membrane,* and *κλαδος, a branch.*

Frons gelatinoso-membranacea, plano-compressa, linearis, disticke decomposito-pinnata, stratis tribus contexta; medullari ex cellulis magnis vesicatis, intermedio ex cellulis minoribus rotundato-angulatis pluriseriatis, corticali ex cellulis minutissimis coloratis in fila brevissima moniliformia verticalia conjunctis. Cystocarpia intramarginalia, subsphærica, sessilia, pericarpio crasso cellulari demum ostiolo aperto, sporas oblongas in fila e placenta basali radiantia evolutas foventia. Tetrasporæ triangule divisæ, sparsæ.

HYMENOCLADIA *divaricata;* frond rose-red, gelatino-membranaceous, decompound-pinnate; rachis flexuous, narrowed at base and apex; pinnæ and pinnulæ linear-lanceolate, patent; the ultimate ramuli minute, setaceous, horizontal, closely set; cystocarps marginal or intramarginal; tetraspores scattered in the cortical layer of the larger branches.

H. divaricata; ***fronde plana rosea gelatinoso-membranacea decomposite pinnata; rachide flexuosa basi et apice attenuata, pinnis pinnulisque lineari-lanceolatis attenuatis patentibus, pinnulis ultimis setaceis minutis horizontali-divaricatis; cystocarpiis submarginalibus sparsis; tetrasporis magnis in ramis majoribus vage immersis.***

HYMENOCLADIA divaricata, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 553. *Harv. Alg. Exsic. Austr. n.* 364.

HAB. Dredged in King George's Sound, and cast ashore at Middleton Bay, K.G.S., *W. H. H.*

GEOGR. DISTR. As above.

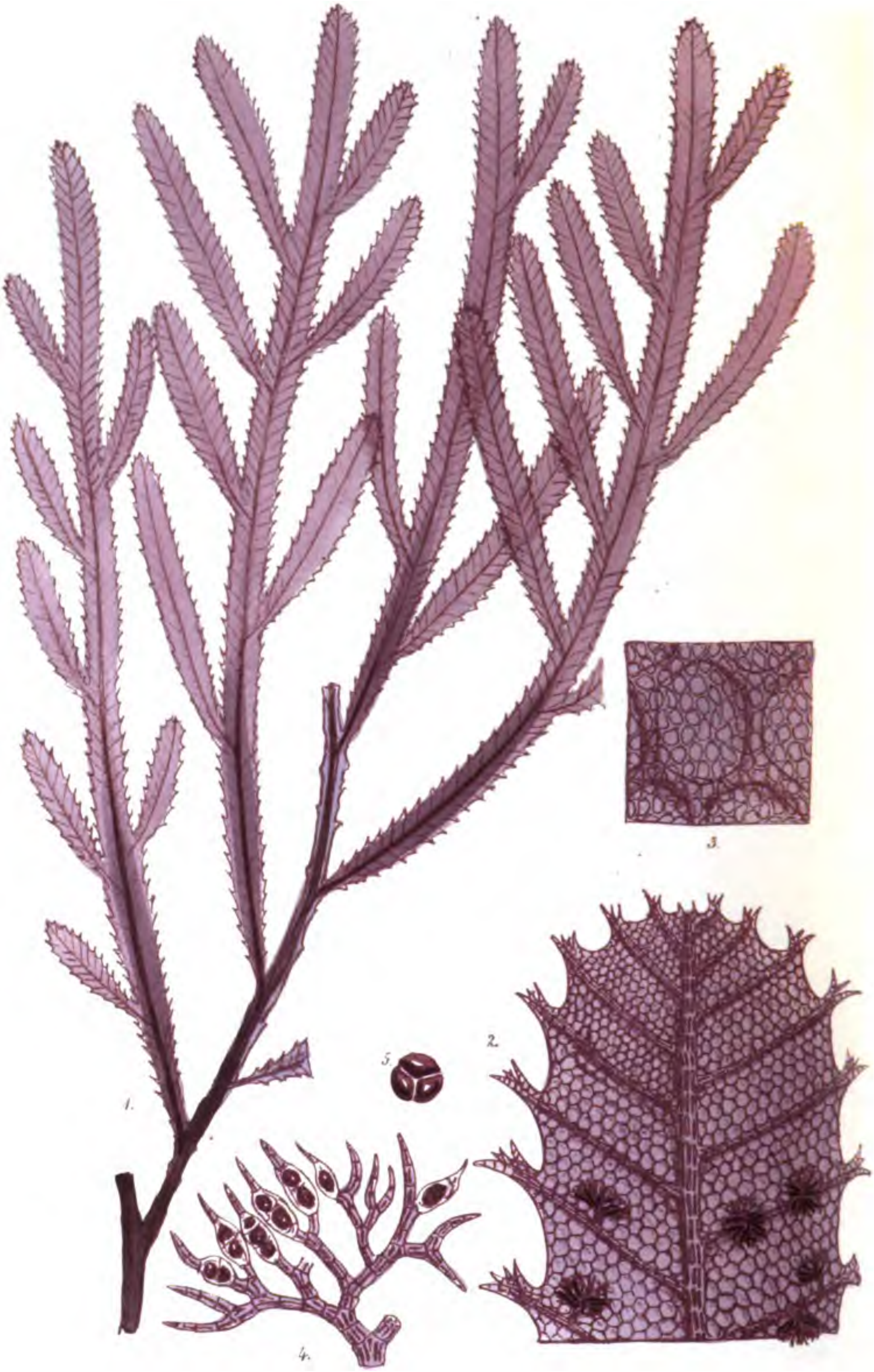
DESCR. *Root* a small disc. *Fronds* sub-solitary, 6–10 inches long, and nearly as much in the spread of the branches, very much and closely branched in a repeatedly pinnate order. The main rachis is not more than two lines in breadth, tapering at each extremity, undivided, or once or twice forked, flexuous, set throughout with horizontally patent, alternate branches of very unequal length, short and long intermixed. These branches, like the stem, taper at each end, and are closely pinnated with a second or third series, and all the branches, of every series, are bordered with setaceous, horizontally patent, minute ramuli. These last are generally strictly marginal, but sometimes spring from the disc. The *conceptacles* are about the size of poppy-seed, globose, inflated, with a dark-red centre, and are commonly sessile on the margin of the frond; their walls are thick, formed of two strata of cells, similar to those of the intermediate and cortical layers of the frond; the placenta is at the base of the nearly-spherical loculus, and bears a tuft of spore-threads. The *spores* are of large size (for the family), and oblong, and formed in all the cells of the spore-thread. The *tetraspores* are thinly scattered among the cortical cells of the larger branches. The *colour* is a brilliant rosy-crimson. The *substance* softly membranaceous and very flaccid, and the plant closely adheres to paper in drying.

This has so much the ramification of Turner's *Fucus divaricatus* (Turn. Hist. t. 181), that I should unhesitatingly have referred it to that species (specimens of which I have never seen), had not Professor J. Agardh, from an examination of authentic materials, pronounced that plant to be a *Chylocladia*, to which genus he could not possibly refer the flat-fronded species here figured. On a closer examination, I venture to associate our plant generically with *Fucus Usnea*, R. Br., which Agardh makes the type of his genus *Hymenocladia*. The ramification and structure of the frond are similar, nor is there any great difference in fructification. Dr. Sonder, on the contrary, regards our *H. divaricata* as being scarcely distinguishable from *Hypnea seticulosa*, an opinion in which I cannot coincide, as that plant has a cylindrical frond of different structure, and the fructification is equally diverse.

Hymenocladia Ramalina, Harv., from King George's Sound, is possibly only a less branched variety of the present, but if so, is at least a remarkable form.

Fig. 1. HYMENOCLADIA DIVARICATA,—*the natural size*. 2. Small portion of the frond, bearing conceptacles. 3. A vertical section through a conceptacle. 4. Spore-strings from the same. 5. Cross section of a branch, showing its structure, and the position of the *tetraspores* in the cortical layer. 6. Tetraspores:—the latter figures variously *magnified*.

Plate XXI



Vincent Brooks Imp.

PLATE XXI.

DICTYMENIA SONDERI, *Harv.*

Gen. Char. *Frond* flat, membranaceous, midribbed, alternately decompound, pinnatifid or rarely foliiferous, areolate; the *medullary* cells large, twelve-sided, colourless, transversely set; the *cortical* minute, irregular, coloured. *Fructification:* 1, ovate, stipitate *ceramidia*, containing a tuft of pear-shaped spores; 2, simple or branched *stichidia*, containing tripartite *tetraspores.*—Dictymenia (*Grev.*), from *δικτυον, a net,* and *ὑμην, a membrane,* because the membrane appears areolated (under a low magnifying power).

Frons plana, membranacea, costata, alterne decomposita, pinnatifida v. raro foliifera, areolata; strato medullari ex cellulis magnis hyalinis dodecahedris transversim ordinatis, corticali ex cellulis minutis coloratis irregularibus formato. Fruct.: 1, *ceramidia pedicellata;* 2, *stichidia propria, simplicia v. ramosa, tetrasporas* 1–2-*seriatas triangule divisas foventia.*

Dictymenia *Sonderi;* stem shrubby, terete or winged; branches broadly linear, midribbed, obtuse, irregularly bi-tripinnatifid; pinnæ and pinnules subdistant, midribbed, and penninerved, strongly areolate, fringed with trifid toothlike processes; stichidia very much branched, rising from the nerves.

D. Sonderi; *caule robusto subtereti; ramis lato-linearibus obtusis costatis bi-tripinnatifidis; laciniis lacinulisque distantibus costatis et penninerviis conspicue areolatis, dentibus tri-multifidis fimbriatis; stichidiis ramosissimis fruticosis ex nervulis enatis.*

Dictymenia Sonderi, *Harv. Alg. Exsic. Austr. n.* 122.

Dictymenia fimbriata, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 538 (*non Grev.*).

Hab. Western Australia: Garden Island, *W. H. H.;* Fremantle, *G. Clifton, Esq.*

Geogr. Distr. As above.

Descr. *Root* a large, fleshy disc. *Stem* hard and woody at base, 1–2 lines in diameter, 2–4 inches long before it branches, gradually narrower, less terete, and more distinctly winged upwards, and passing into the linear, main-rachis of a much divided frond. The full-grown *frond* is 1½–2 feet long or more, and several times compounded in an irregularly pinnatifid order, The main branches are sub-bipinnatifid, but the pinnæ are of unequal length and rather distantly placed, and the strictly pinnate character is therefore often lost. All the divisions of the frond issue at acute angles, and are strictly linear, about 2–3 lines wide, and rounded at the top. The older ones are strongly, the younger faintly midribbed, and the midrib is pinnated with slender, obliquely inserted veins, which proceed to the margin, and are excurrent into marginal, toothlike, cloven processes. These latter are commonly trifid, their segments subulate and alternately cut. The interior (or medullary) cellules are of large size, with valid walls, and are very conspicuous through the semitransparent thin coating of superficial cellules, appearing, under a pocket-lens, like hexagonal areolations. The *ceramidia* have not been observed. The *stichidia* spring from the lateral veinlets of the segments or from the midrib; and are excessively branched, dichotomously; they bear tetraspores singly or in pairs in the swollen upper divisions. The *substance* is rigidly membranous, and the frond does not adhere to paper in drying. The *colour* is a dull reddish-brown.

This fine species is nearly allied to *Dict. tridens*, but is a larger and stronger-growing plant, with much less deeply cut, broader, and more obtuse laciniæ, stronger midribs, which are well marked even to the extremities, and more conspicuous areolations. The *areolations* in this genus, however conspicuous, are never superficial, the external coating being always formed of minute cellules. Hence the tessellated appearance is more evident under a common pocket-lens than when a higher magnifying power is employed.

I bestow the specific name in honour of my friend Dr. Sonder, of Hamburg, who has well illustrated the Algæ of Australia in several able memoirs. I had originally referred this plant to *D. fimbriata*, but erroneously. The latter, to judge by Turner's figure, is much nearer to *D. spiralis*, if it be distinct.

Fig. 1. DICTYMENIA SONDERI,—*the natural size*. 2. Apex of a segment,—*moderately magnified*, showing midrib, veinlets, false areolations, and shrubby stichidia. 3. Small portion of the same,—more highly *magnified*, showing the surface-cellules, and the medullary cells appearing through. 4. A branch from a decompound stichidium. 5. A *tetraspore* from the same:—*magnified*.

Plate XVI.

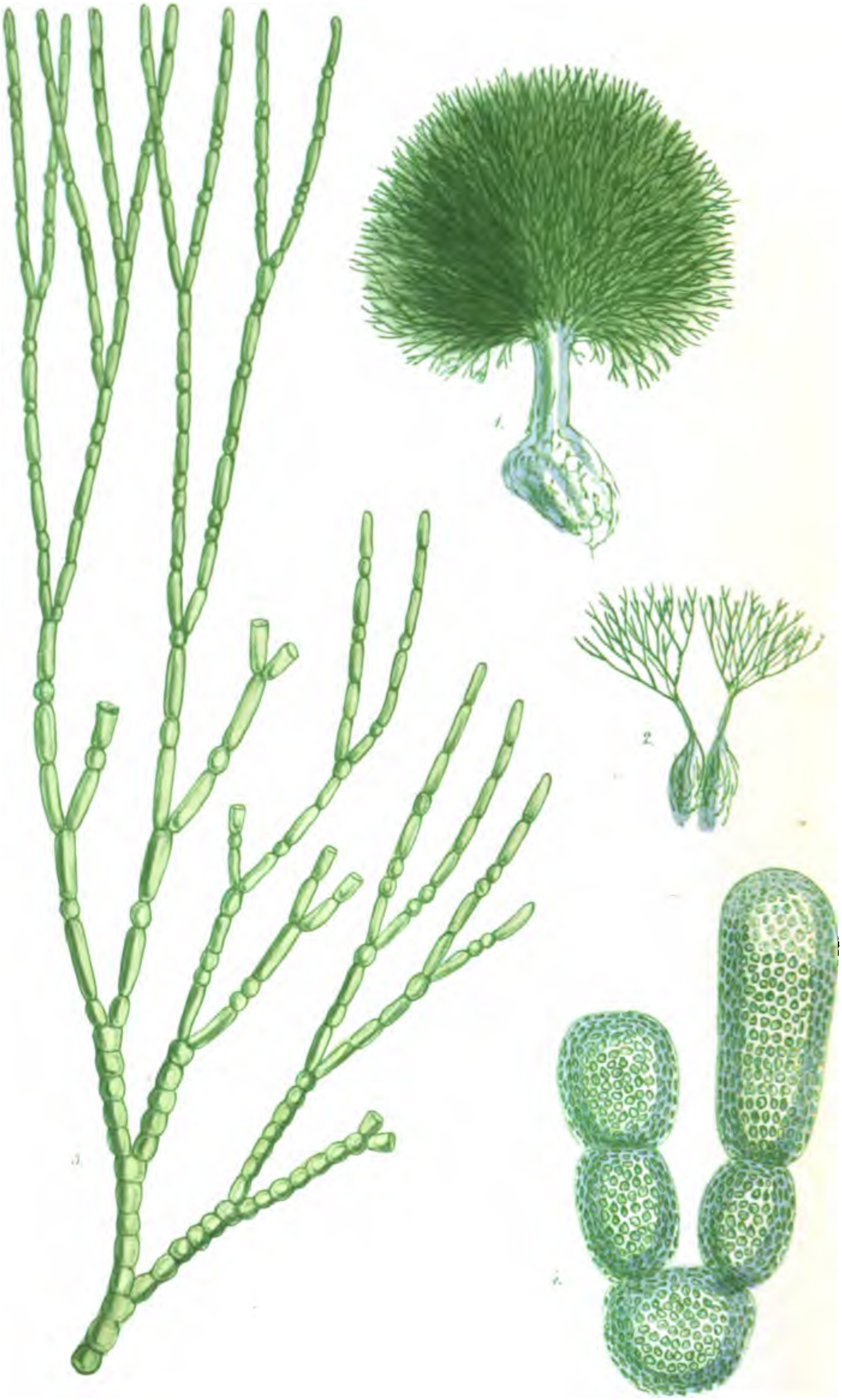


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PLATE XXII.

PENICILLUS ARBUSCULA, *Mont.*

GEN. CHAR. *Root* fibrous, much branched, matted. *Frond* stipitate, dendroid. *Stipes* erect, terete, incrusted, composed of numerous unicellular, longitudinal, cylindrical, branching, interwoven filaments, and crowned with a dense pencil of confervoid, articulated, free or cohering ramelli. *Cells* covered with a porous, calcareous pellicle.—PENICILLUS (*Lam.*), from *penicillus*, a painter's brush, which these plants resemble.

Radix fibrosa, ramosissima, implicata. Frons stipitata, dendroidea. Stipes erectus, teres, incrustatus, ex filis numerosis unicellularibus longitudinalibus cylindraceis ramosis intertextis formatus, ramellis confervoideis dense fasciculatis nunc liberis nunc in lamellas cohærentibus coronatus. Cellulæ pelliculâ calcareâ porosâ corticatæ.

PENICILLUS *Arbuscula;* stipes short, terete, smooth; capitulum dense, fastigiate; filaments free, dichotomous, moniliform below, above composed alternately of globose and cylindrical cells, the latter about 3–4 times as long as broad.

P. Arbuscula; *stipite brevi tereti lævi; capitulo dense fastigiato; filis liberis dichotomis infra moniliformibus supra ex cellulis nunc globosis nunc cylindraceis diametro 3–4-plo longioribus subalternis formatis.*

PENICILLUS Arbuscula, *Mont. Voy. Pôl. Sud, p.* 25. *t.* 14. *f.* 4; *Sylloge, p.* 451. *Harv. Trans. R. I. Acad. v.* 22. *p.* 564.

CORALLOCEPHALUS Arbuscula, *Kütz. Sp. Alg. p.* 506.

HAB. On sand-covered rocks, between tidemarks. Abundant on some of the reefs at Rottnest Island, Western Australia, *W. H. H.*

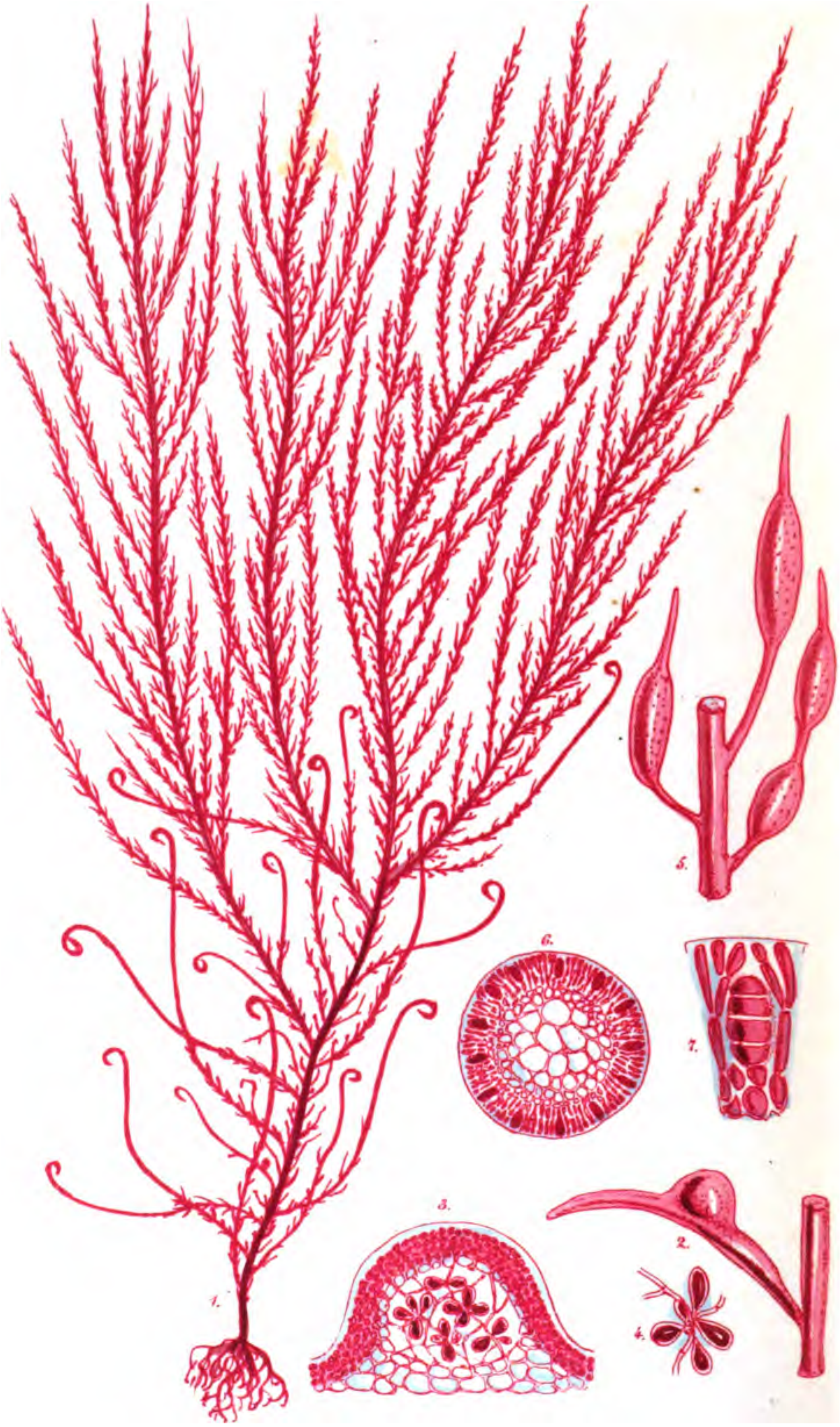
GEOGR. DISTR. At the Island of Toud, *D'Urville.*

DESCR. *Root* a mass of excessively branched, interwoven fibres, deeply descending into the sand. *Stem*, when full-grown, about an inch in length, 2–3 lines in diameter, terete or somewhat compressed, either cylindrical or widened upwards, composed of densely interwoven filaments, and coated with a smooth, calcareous crust. In the young *frond* the stipes consists of but two or three filaments, and a strata of the frond occurs in which there is no stipes, but the moniliform, confervoid filaments arise directly from the matted root-fibres. In ordinary specimens the *stipes* is crowned with a large, dense, globular tuft of slender setaceous filaments, 1–2 inches long, and repeatedly dichotomous. These filaments (or *ramelli*) are articulated; the articulations variable in length. In the lower part all are generally globose, with constricted nodes; in the upper, globose and cylindrical cells irregularly alternate with each other. As in all the genus, the cell-walls are coated with a thin pellicle of carbonate of lime, pierced with pores, which are readily seen after the plant has been treated with acid. The *colour*, when growing, is bright green, and owing to the calcareous crust, it frequently turns white in drying. The *substance* is rigid, and the plant does not adhere to paper in drying.

This is one of those lime-incrusted Algæ which, on account of their calcareous crust, were formerly classed among the flexible Corals. The genus *Penicillus*, aptly named by Lamarck, from the resemblance of its frond to a painter's brush, includes several Algæ of similar habit, mostly found on shallow coral-reefs within the tropics. The subject of our present Plate is the only one yet found in Australia; nor am I aware of any other locality than that at Rottnest Island. It is well distinguished from other described species by the bead-like lower articulations, and the alternating bead-like and cylindrical upper joints.

Fig. 1. PENICILLUS ARBUSCULA; a full-grown plant,—*the natural size.* 2. Young plants, before the formation of the stipes. 3. Portion of one of the dichotomous, confervoid ramelli:—*magnified.* 4. Cells from the same, after the lime has been removed by acid,—*more highly magnified.*

Plate XXI.



Vincent Brooks Imp.

PLATE XXIII.

HYPNEA EPISCOPALIS, *Hook. fil. et Harv.*

GEN. CHAR. *Frond* terete or compresso-plane, irregularly much branched, and set with awl-shaped ramuli, composed of three strata of cells; the *medullary* of a few slender, longitudinal filaments (sometimes wanting); the *intermediate* of oblong, angular, hyaline cells; the *cortical* of one or more rows of very minute, coloured cellules. *Fructification:* 1, hemispherical *conceptacles*, containing, within a thickish pericarp, several clusters of pedicellate spores, affixed to slender anastomosing filaments; 2, zonate *tetraspores*, lodged in swollen ramuli.—HYPNEA (*Lamour.*), from *Hypnum*, a genus of Mosses; because these plants are finely branched, like Mosses.

Frons teres v. plano-compressa, ramosissima, ramulis subulatis obsessa, stratis tribus contexta; strato medullari cellulis filiformibus elongatis paucis, intermedio cellulis oblongis majoribus angulatis hyalinis pluriseriatis, corticali cellulis minutis coloratis constante. Fruct.: 1, *cystocarpia hemisphærica, intra pericarpium hemisphæricum crassum fasciculos plures sporarum pedicellatarum ad fila reticulato-anastomosantia affixarum foventia;* 2, *tetrasporæ zonatim divisæ, in ramulos turgidos evolutæ.*

HYPNEA *episcopalis;* root branching; frond terete, blood-red, elongate, much branched; branches virgate, subsimple, attenuate, densely set with short secondary-branches, and erect, subulate ramuli, toward the base bearing several long, naked branchlets, incrassated and hooked at the extremities; conceptacles sessile on the upper face of fusiform, simple, patent ramuli; tetraspores in pod-like, pedicellate and mucronate, incrassated ramuli.

H. episcopalis; *radice ramosa; fronde tereti sanguinea elata ramosissima; ramis virgatis elongatis simplicibus attenuatis, ramis minoribus (sæpius brevibus) ramulisque erectis subulatis minutis plus minus obsessis, ramis inferioribus longe nudis apice incrassatis et hamatis; ramulis capsuliferis simplicibus fusiformibus, sporiferis basi et apice filiformibus medio incrassatis.*

HYPNEA episcopalis, *Hook. fil. et Harv. Lond. Journ. v.* 6. *p.* 406. *Kütz. Sp. Alg. p.* 760. *J. Ag. Sp. Alg. p.* 433. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 552; *Harv. Alg. Austr. n.* 341.

HAB. On rocks, at low-water mark. Frequent on the western and southern shores of Australia, in several places. Also in Tasmania.

GEOGR. DISTR. As above.

DESCR. *Root* much branched. *Fronds* 10–12 inches long or more, twice as thick as hog's bristle below, attenuated upwards, terete, generally with a percurrent stem, closely set with long, virgate branches, and clothed with short ramuli. The *main branches* are 6–8–10 inches long, undivided, and for the greater portion of their length bearing *secondary branches* of very unequal lengths. These, as well as the main branches, are furnished with short, subulate, erect ramuli. From the lower part of the stem and of the principal branches issue several filiform naked *branchlets*, 1–2 inches in length, which are incrassated and strongly hooked at the extremity, and attach themselves by the hook to neighbouring objects. The *conceptacles* are minute, and generally borne about the middle of the ramulus, projecting toward its upper side; the *spores* are somewhat pyriform, 4–8 growing in each cluster. The *tetraspores* are lodged in pod-like ramuli. The *substance* is soft, though more cartilaginous than membranous, and the frond adheres to paper in drying. The *colour*, when growing, is a deep-red, becoming much brighter and passing into scarlet in fresh-water.

* * *

The genus *Hypnea* is founded on the "*Fucus musciformis*" of old writers, with which several species of more recent discovery have been associated. These plants have all a similar habit, being characterized by densely tufted, filiform fronds, thickly sprinkled, and often entirely beset, with short, spine-like ramuli. In several species some of the branches are lengthened into tendrils, having hooks at the extremity. In the present form these tendrils resemble an episcopal *crosier*, on which account (and for the scarlet colour) the specific name *episcopalis* has been assigned.

The species are very difficult to distinguish, and no doubt too many have been established by describers of solitary specimens. The present is, at least, a well-marked form, and by no means rare on the Australian coast.

Fig. 1. HYPNEA EPISCOPALIS,—*the natural size.* 2. A ramulus, bearing a *conceptacle.* 3. Vertical section of a conceptacle. 4. A spore-cluster, from the same. 5. Ramuli, with swellings in which *tetraspores* are imbedded. 6. Cross-section of the swelling. 7. A tetraspore and surrounding cells, from the same:—the latter figures *magnified.*

Plate [illegible]

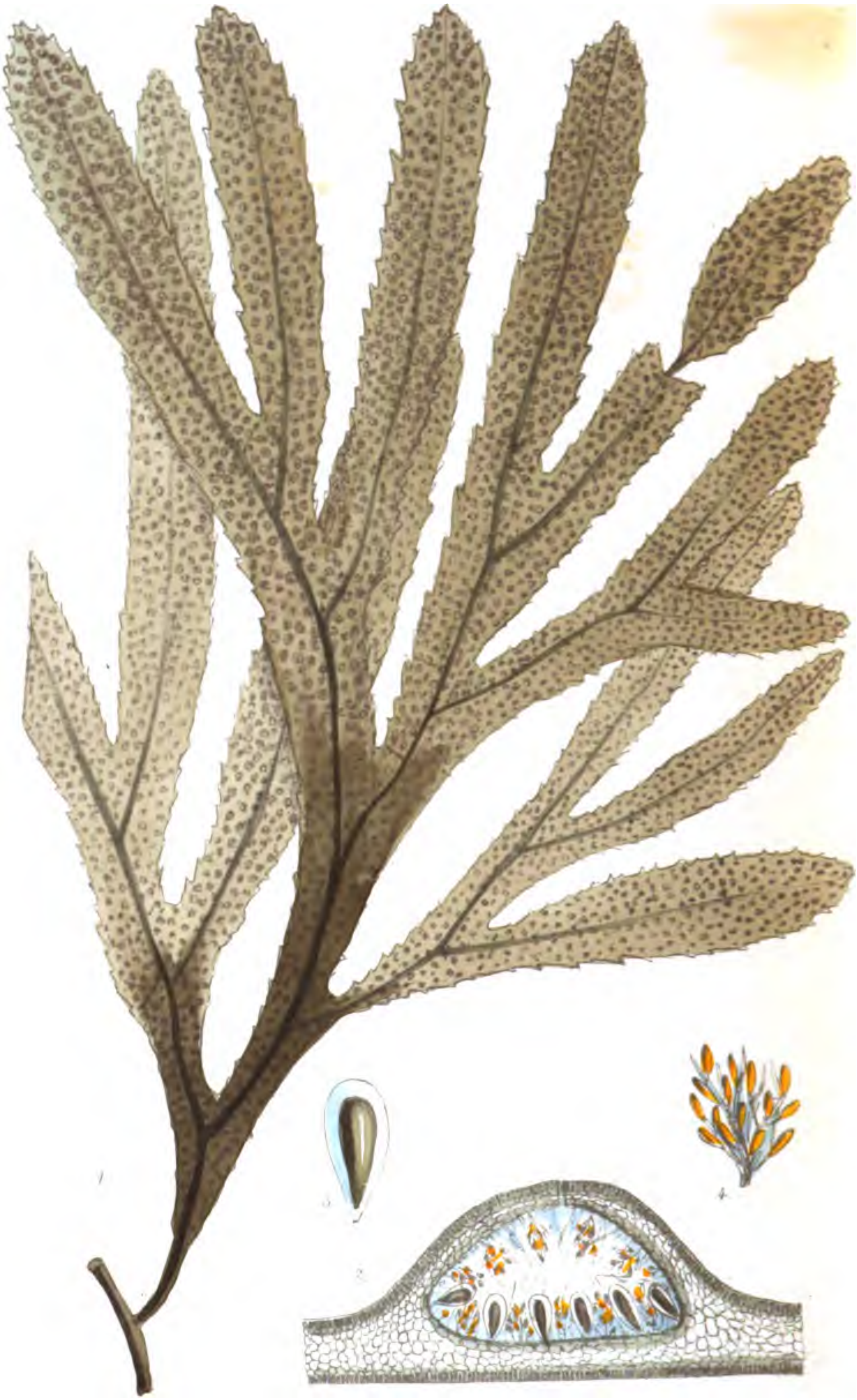


PLATE XXIV.

MYRIODESMA LATIFOLIA, *Harv.*

GEN. CHAR. *Root* discoid. *Stem* terete, branched; the branches terminating in dichotomous, midribbed leaves. Proper *receptacles* and *vesicles* none. *Spore-cavities* scattered over both surfaces of the leaves, hemispherically-prominent, monœcious. *Spores* obovoid, subsessile. *Paranemata* simple.—MYRIODESMA (*Dcne.*), from *μυριος, a thousand,* and *δεσμη, a tuft* or cluster; from the numerous spore-clusters.

Radix scutata. Caulis teres, ramosus; ramis in phyllodia dichotoma costata desinentibus. Receptacula propria et vesiculæ nullæ. Scaphidia in utraque pagina foliorum sparsa, hemisphærice prominentia, monoica. Sporæ obovoideæ, subsessiles. Paranemata simpliciuscula.

MYRIODESMA *latifolia;* leaves broadly linear, pinnato-dichotomous, multipartite, sharply serrate; spore-cavities very numerous and densely set.

M. latifolia; *phyllodiis lato-linearibus pinnato-dichotomis multipartitis serratis; scaphidiis numerosissimis, densissime sparsis.*

MYRIODESMA latifolia, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 354; *Austr. Exsic. n.* 42.

HAB. Western Australia. At Garden Island, *W. H. H.*

GEOGR. DISTR. As above.

DESCR. *Root?* *Fronds* 2–3 feet long. *Stem* shrubby, 1–2 lines in diameter, terete or subcompressed, much branched, flexuous, irregularly dichotomous, or, by occasional suppression, subpinnate. *Branches* patent, short, passing into the bases of the leaves, and continued upwards as a forking midrib, until lost in the alternate segments. *Leaves* 8–12 inches long or more, from half an inch to an inch or more in breadth, repeatedly dichotomous, but irregularly; one arm of the fork being frequently suppressed, the ramification is partly pinnato-flabelliform and partly dichotomous. Sometimes the middle segment is much prolonged into a jugament, and regularly pinnated with dichotomous segments. The margin is sharply serrate throughout. The *midrib* is strongly marked and thickened in the lower segments, but becomes fainter and fainter towards the summit, where it nearly vanishes altogether. The *spore-cavities* are very densely sprinkled over the whole surface of the leaves, without any regular order; they resemble minute pustules, and are of a darker colour than the leaf. Spores and tufted antheridia are found in the same cavity. The *substance,* though thin, is coriaceous. The *colour* is a dark fucoid brown.

To the European botanist the Plate here given will recall to mind the common *Fucus serratus* of the Northern Atlantic, which has a frond of very similar form and similarly serrated. In the northern species, however, as in all of the restricted genus *Fucus*, the spore-cavities are confined to the apices of the branches, which are transformed into imperfectly organized *receptacles*; but in this "*representative form*" of the Southern Ocean the spore-cavities are scattered, without order, over the whole frond. On this character Decaisne founded his genus *Myriodesma*, which now includes at least three species, two from Western Australia and one from Victoria and Tasmania. The latter (*M. integrifolia*, Harv.) having been figured in the 'Flora Tasmanica' will not be re-figured in the present work. It may be thus characterized:—

M. integrifolia; *caule basi tereti sursum plus minus alato, costa evanescente; phyllodiis distichis decomposite pinnatifidis, laciniis enervibus linearibus obtusis margine subintegerrimis (v. apicem versus denticulatis); scaphidiis numerosissimis sparsis.*

Hab. Geelong and Western Port Victoria; and Tasmania.

A fourth supposed species (*M. quercifolia*, Ag.), founded on the "*Lessonia quercifolia*, Bory," a little-known plant, said to be a native of New Zealand, requires re-examination and verification.

Fig. 1. MYRIODESMA LATIFOLIA; a leaf,—*the natural size*. 2. Section of the frond, through the centre of one of the spore-cavities. 3. Spores. 4. A tuft of *antheridia*:—the latter figures more or less *magnified*.

Plate XXI.

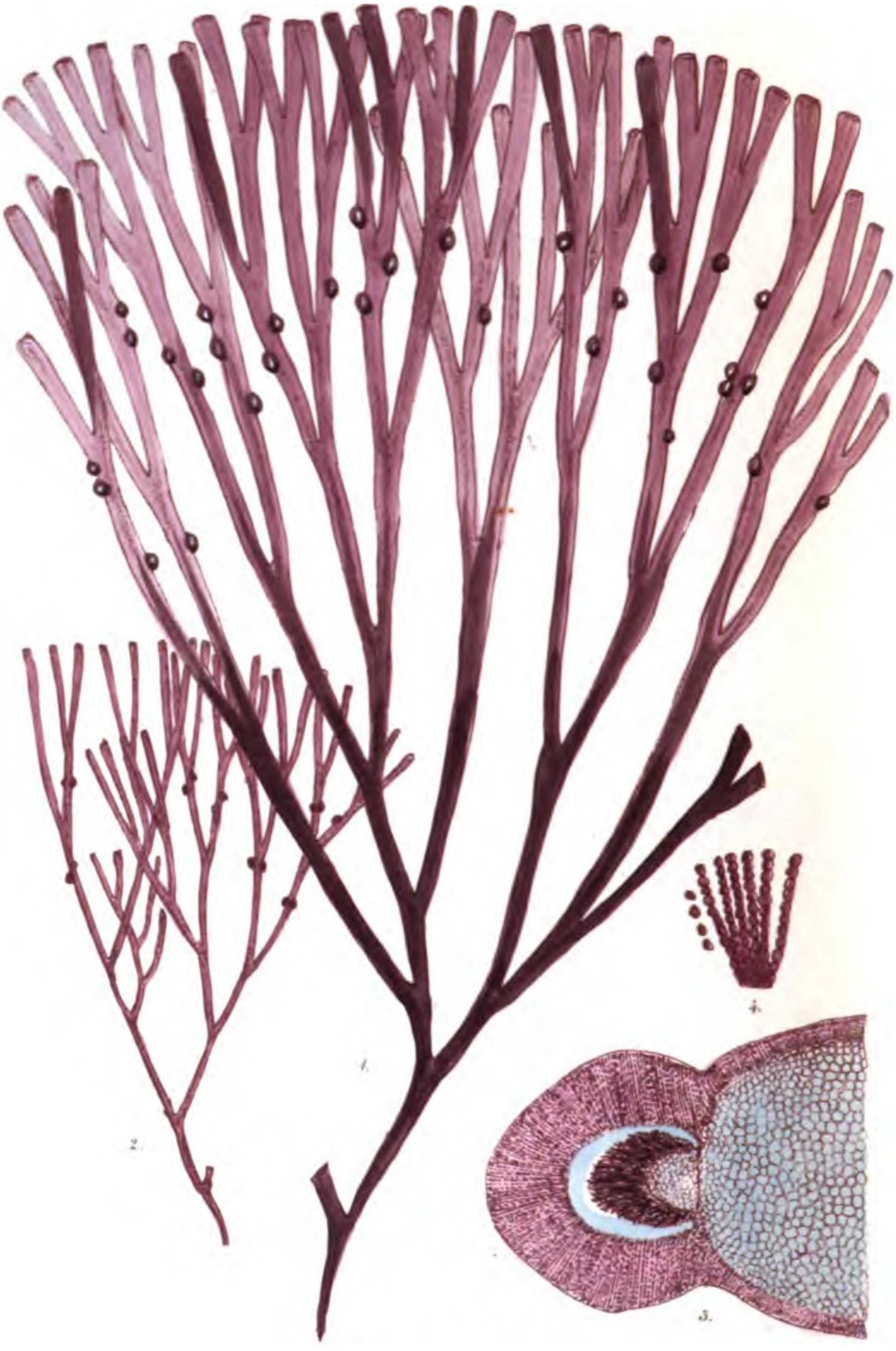


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PLATE XXV.

MELANTHALIA OBTUSATA, *J. Ag.*

GEN. CHAR. *Frond* linear, plano-compressed, dichotomous and fastigiate, coriaceous, solid, densely cellular; the inner stratum composed of elongate, angular, colourless cells; the outer of very minute, coloured, vertically seriated cellules. *Fructification:* 1, marginal, hemispherical, thick-walled *conceptacles,* containing, on a central placenta, densely tufted, moniliform spore-threads, at length dissolving into minute spores; 2, *tetraspores* (?) . . . . ?—MELANTHALIA (*Mont.*), from μελας, *black,* and θαλος, *a branch;* because the frond becomes very dark in drying.

Frons linearis, plano-compressa, dichotomo-fastigiata, coriacea, solida, duplici (*v.* "*subtriplici*") *strato composita; interiore cellulis elongatis tenuibus angulatis hyalinis, exteriore cellulis minutis coloratis densissime verticaliter seriatis constante. Fruct.:* 1, *coccidia marginalia, hemisphærica, intra pericarpium crassissimum fila sporifera moniliformia ex placenta centrali egredientia in sporas demum soluta foventia;* 2, *tetrasporæ (ignotæ).*

MELANTHALIA *obtusata;* frond elongate (1–2 feet long), repeatedly dichotomous and flabelliform; segments flattish, two-edged, linear, bluntly truncate; conceptacles marginal, scattered.

M. obtusata; *fronde pedali et ultra decomposite dichotoma flabelliformi; segmentis lato-linearibus ancipitibus linearibus obtuse truncatis; coccidiis sparsis.*

MELANTHALIA obtusata, *J. Ag. Sp. Alg. v.* 2. *p.* 614. *Harv. Alg. Austr. Exsic. n.* 320.

MELANTHALIA Billardieri, *Mont. An. Sc. Nat. ser.* 2. *v.* 20. *p.* 296. *Kütz. Sp. Alg. p.* 784. *Mont. Sylloge, p.* 417.

RHODOMELA obtusata, *Ag. Sp. Alg. p.* 383; *Syst. p.* 200.

FUCUS obtusatus, *Labill. Nov. Holl. p.* 255. *Turn. Hist. t.* 145.

Var. *β. intermedia;* frond very narrow, excessively branched.

Var. *β.* intermedia; *fronde angustissima, ramosissima.*

MELANTHALIA intermedia, *Harv. Alg. Exsic. Austr. n.* 319.

MELANTHALIA abscissa, *Hook. et Harv. Alg. Tasm. in Lond. Journ. v.* 4. *p.* 548 (*excl. syn.*).

MELANTHALIA Jaubertiana, *Sond. in Linn. v.* 25. *p.* 689 (*excl. syn.*).

HAB. On rocks, etc., in the Laminarian zone. South coast of New Holland, from Cape Northumberland eastwards, *Labillardière, etc.* Rivoli Bay, *Dr. Mueller.* Common on the coast of Victoria, and throughout Bass's Straits, *Dr. Mueller, W. H. H., etc.* Tasmania, *Gunn, C.*

Stuart, W. H. H.—VAR. *β*. Frequently found growing from the same base as the normal form. Victoria, *F. Mueller, W. H. H.* Tasmania, *Dr. Jeannerett, Mr. Stuart.*

GEOGR. DISTR. As above.

DESCR. *Root* a large fleshy disc, ½ inch or more in diameter. *Fronds* several from the same base, 1–2 feet long, from half a line to two lines in breadth, compressed and two-edged, thickened in the middle, shortly stipitate, but soon forking, and then excessively divided in a nearly regular dichotomous order. The full-grown fronds are broadly flabelliform; the segments are all linear, sometimes slightly undulate, quite entire, distichous, and very blunt; the apex abruptly truncated, but the edges rounded and somewhat thickened. The angles are acute and narrow. *Cystocarps* are frequently found; they are at first hemispherical, becoming conical in age, opaque, with very thick walls, composed of vertically seriated, minute, coloured cellules, and contain, on a large, fleshy central placenta, a very dense sporiferous nucleus formed of radiating filaments. *Spores* very small, roundish. *Tetraspores* unknown. *Substance* very tough and leathery, horny or woody when dry. *Structure* extremely dense. *Colour* dark brownish-purple, becoming blackish-brown in drying. It does not adhere to paper.

The frond in this plant varies very much in breadth and in degree of ramification, but is very constant in all its other characters. All grades of breadth between the narrow and wide forms represented in our figure frequently occur, and I have even seen both very narrow and wide-branched stems arise from the same disc-like root. This necessitates their union under one specific name. I had formerly distributed the narrower varieties (var. *β*) as a distinct species, under the name *M. intermedia;* and at a still earlier period had confounded them with the New Zealand species, *M. abscissa.* I am now disposed to refer all the numerous forms I possess, whether from Australia or Tasmania, to *M. obtusata.* Its narrower varieties are with difficulty distinguishable from *M. abscissa,* but as the wide form is not found in New Zealand, I retain the latter name for the *Melanthalia* of that country. The Australian specimens of "*M. Jaubertiana*" will, I believe, fall under the present, and the New Zealand ones under the latter species.

Fig. 1. MELANTHALIA OBTUSATA,—*the natural size.* 2. Var. *β. intermedia* (a branch only). 3. Horizontal section of a conceptacle and of a portion of the branch. 4. Some spore-threads from the nucleus:—the two last figures *magnified.*

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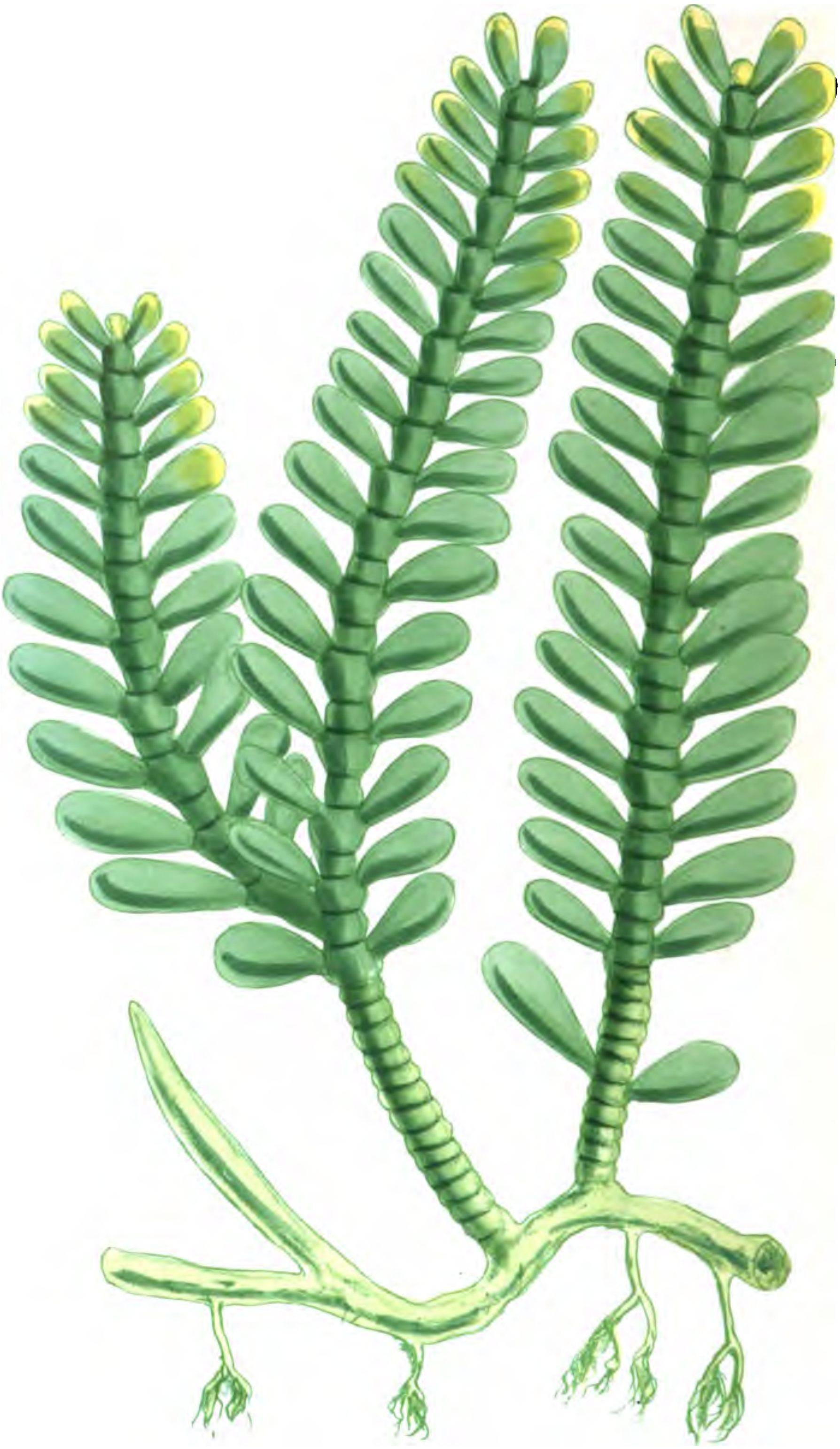

Vincent Brooks imp

PLATE XXVI.

CAULERPA CACTOIDES, *Ag.*

GEN. CHAR. ***Frond*** consisting of prostrate *surculi* rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. ***Substance*** horny-membranous, destitute of calcareous matter. ***Structure*** unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semi-fluid, grumous matter. ***Fructification*** unknown.—CAULERPA (*Lamour.*), from *καυλος, a stem,* and *ἑρπω, to creep.*

> *Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membranâ continuâ hyalinâ intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fruct. ignota.*

CAULERPA *cactoides;* surculus robust, glabrous; fronds erect, shortly stipitate, linear, distichously pinnate; rachis articulato-constricted; pinnæ opposite, obovoid, saccate, about thrice as long as their greatest width.

C. cactoides; *surculo crasso glaberrimo, fronde erecta breve stipitata lineari disticke pinnata; rachide articulato-constricta v. nodosa; pinnis oppositis obovoideis saccatis diametro subtriplo longioribus obtusissimis.*

CAULERPA cactoides, *Ag. Sp. Alg. v.* 1. *p.* 439; *Ag. Syst. p.* 182. *Sond. in Linn. v.* 25. *p.* 661, *et v.* 26. *p.* 507.

CAULERPA corynephora, *Mont. Voy. Pôl. Sud, p.* 13. *t.* 6. *f.* 2; *Mont. Sylloge, p.* 452. *Kütz. Sp. Alg. p.* 496. *Harv. Alg. Austr. Exsic. n.* 556.

CHAUVINIA cactoides, *Kütz. Sp. Alg. p.* 499.

AHNFELDTIA cactoides, *Trevis. Linn. v.* 22. *p.* 142.

AHNFELDTIA corynephora, *Trev. l.c. p.* 143.

FUCUS cactoides, *Turn. Hist. t.* 171.

HAB. Rocks below low-water mark, and on the steep sides of deep rock-pools. Western and southern coasts of Australia; not unfrequent.

GEOGR. DISTR. As above. Ins. Toud, *D'Urville.*

DESCR. *Surculi* extensively creeping, 2–3 lines in diameter, naked, glabrous, glossy when dry, but shrivelled, rooting at long intervals, and throwing up fronds at every one or two inches. *Fronds* 10–12 inches long or more, simple or with one or two lateral branches, broadly linear in outline, simply pinnate. The rachis or stem is bare of pinnæ for a short distance above the base; thence upwards it is regularly set with opposite pinnæ, and is throughout strongly constricted, as if jointed, at short intervals, and thus divided into well-marked nodes and internodes. The internodes are generally shorter than their breadth, but sometimes longer and shorter alternate with each other. Every second internode, or sometimes every internode, bears a pair of opposite, obovoid-oblong, very obtuse pinnæ, ½–¾ inch long and 2–3 lines wide, terete and bag-like when recent, compressed when dry. *Substance* horny. *Colour* a brilliant grass-green, becoming olivaceous in age and in drying.

In the distribution of my Australian duplicates I have referred this species to *C. corynephora*, Mont., and, I think, correctly; for though the figure given by Dr. Montagne represents a smaller and rather more slender specimen than the one here chosen for illustration, it differs in no essential character; and some of my Australian specimens are equally small and narrow. My reference to the earlier *C. cactoides* of Brown and Turner is open to graver objections, and yet I cannot persuade myself that the plant now figured is not identical with what they had in view; for our plant abounds along the whole coast visited by Dr. Brown, and could not well have escaped his notice, whereas no specimen quite agreeing with Turner's figure and description has been found by recent Collectors who have carefully explored the Australian shores. I suppose therefore that Turner had before him a badly dried and possibly a distorted specimen, and was thus led to figure and describe the ramenta as "imbricated on all sides," and not strictly *distichous*, as they invariably are on all the many specimens I have examined. In all other respects our plant sufficiently agrees with Turner's description, and the name *cactoides* is quite expressive of its succulent and robust characters.

Fig. 1. CAULERPA CACTOIDES,—*the natural size.*

Plate XXVII.

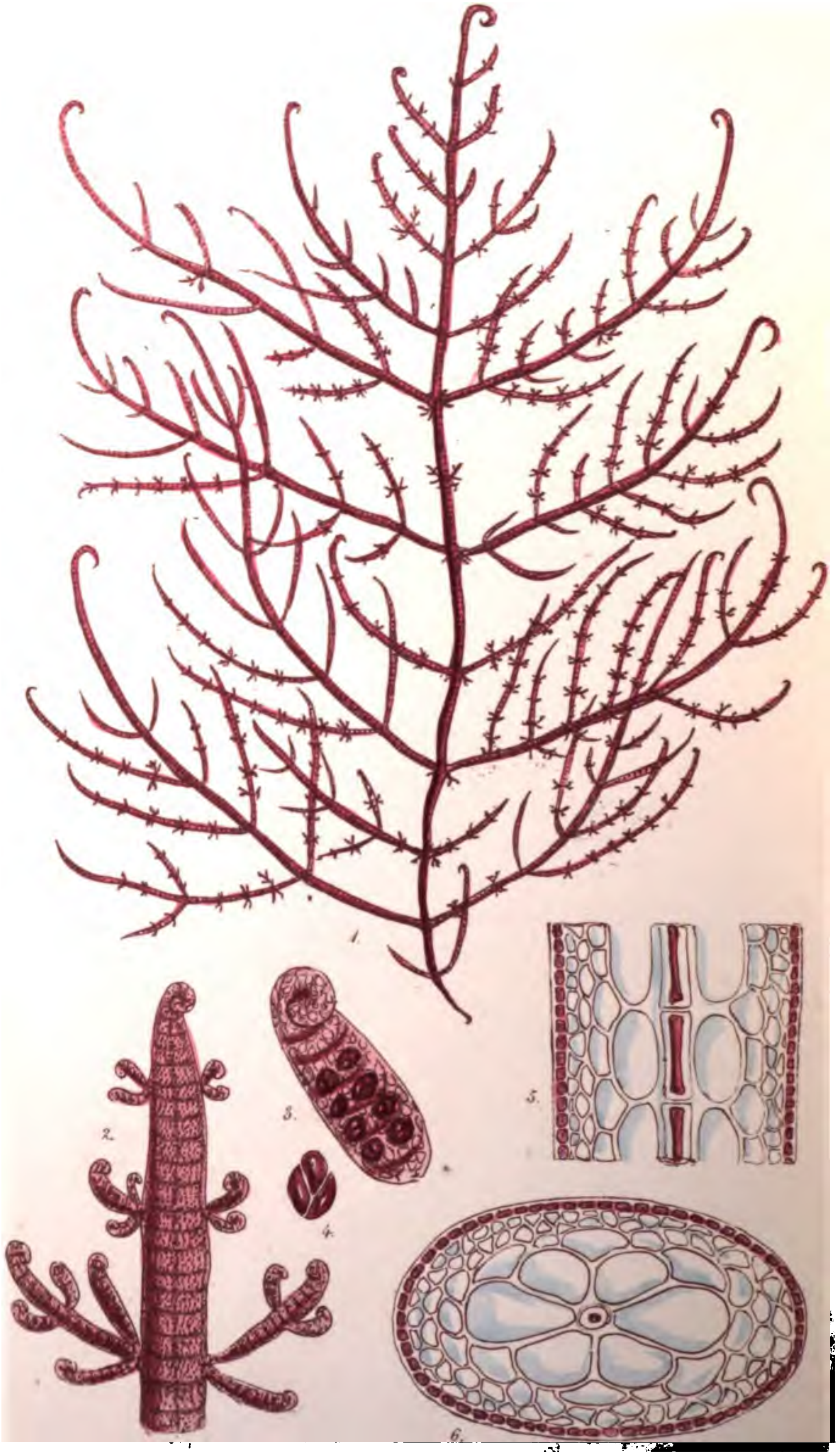

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PLATE XXVII.

RYTIPHLŒA AUSTRALASICA, *Endl.*

GEN. CHAR. *Frond* compressed or terete, dendroid, pinnate, transversely striate, corticated; the *axis* articulated, composed of a circle of large oblong cells surrounding a central cell; the periphery of several rows of small, angular, (mostly) coloured cells. *Fructification:* 1, ovate *ceramidia* containing a tuft of pear-shaped spores; 2, *stichidia* containing tripartite *tetraspores.*—RYTIPHLŒA (*Ag.*), from *ρυτις, a wrinkle,* and *φλοιος, bark;* because the surface is transversely furrowed or striate.

Frons compressa v. teres, dendroidea, pinnatim composita, transversim ruguloso-striata, areolata, axi articulato ex cellulis oblongis magnis pluribus cellulam centralem cingentibus conflato percursa; strato peripherico cellulis pluriseriatis angulatis corticata. Fruct.: 1, *ceramidia;* 2, *stichidia propria sæpius simplicia, tetrasporas biseriatas includentia.*

RYTIPHLŒA *australasica;* frond slender, compressed, decompound-pinnate, laxly much branched; the pinnæ and pinnules opposite (or, by occasional suppression, alternate), subdistant, filiform, very patent, often hooked at the point; the costa distinct; stichidia in opposite fascicles, circinate, fusiform.

R. australasica; *fronde tenui compressa decomposite pinnata laxe ramosissima; pinnis pinnulisque sæpius oppositis nunc vagis remotiusculis filiformibus, patentissimis apice hamatis; costa conspicua; stichidiis fusiformibus apice involutis oppositis sæpe fasciculatis simplicibus ramosisve.*

RYTIPHLŒA australasica, *Endl.* 3*rd Suppl. p.* 48. *Harv. Ner. Austr. p.* 32. *Harv. Alg. Exsic. Austr. n.* 134.

RHODOMELA australasica, *Mont. Canar. p.* 54, *in note.*

HALOPITHYS australasica, *Kütz. Sp. Alg. p.* 841.

HAB. Cast ashore from deep water. Very abundant along the western and southern shores of Australia. Tasmania, *Labillardière, C. Stuart.*

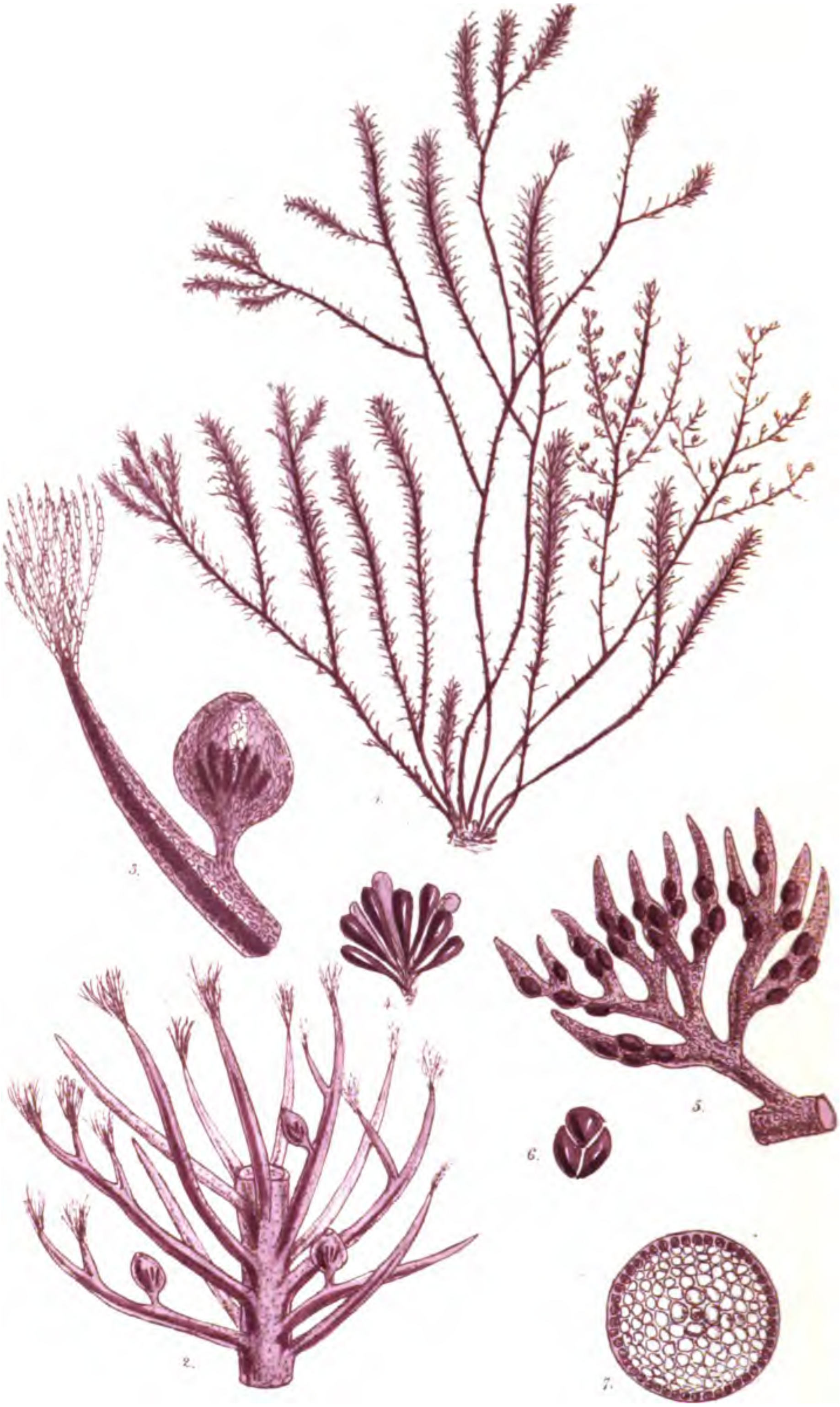
GEOGR. DISTR. As above.

DESCR. *Root* branching. *Fronds* 4–10 inches long, densely tufted, ½ line or rather more in diameter, compressed, very much branched; the ramification normally opposite but frequently irregular. The main branches are often longer than the stem and spread horizontally; they are set throughout, at short distances, with opposite, very patent, virgate secondary branches; and these often bear a third or fourth series of similar, but smaller, branchlets. All the divisions taper at the base, and are attenuated to the point, which is often incurved or hooked. The cells composing the peripheric stratum are pellucid, and consequently the articulated axial tube, which is filled with strongly coloured endochrome, is distinctly visible; and the transverse ruguli or striæ are also obvious, especially in dried specimens. When barren the branches and ramuli are quite bare. When bearing *stichidia*, these issue at short intervals throughout all the branches and ramuli, and give the plant a racemose aspect. The stichidia are simple or pinnate, opposite, and often in tufts, and are always involute at the tips; they contain a double row of tetraspores. *Ceramidia* unknown. *Colour* a dark reddish-brown or brown-red, becoming much darker in drying. *Substance* membranaceous. The frond very imperfectly adheres to paper in drying.

A well-marked species of *Rytiphlœa*, and well named *australasica*, being abundantly cast ashore on many parts of the southern coast, and being the only Australian representative of the genus commonly met with. One or two other species are known in Australia, but are among the rarer of the Algæ. The genus *Rytiphlœa* has representatives in tropical seas, and in all the warmer parts of the temperate zones; and one or two outlying species reach the coasts of Northern Europe. It differs from *Rhodomela* by its more distinctly articulated axis and transversely striate frond; and from *Polysiphonia*, to which it is naturally more nearly allied, by the total absence of articulated ramuli, and by the tetraspores being (usually) confined to proper receptacles or stichidia. From *Dictymenia* it differs in wanting a midrib, and in habit.

Fig. 1. RYTIPHLŒA AUSTRALASICA,—*the natural size.* 2. Apex of a fertile branch, with *stichidia.* 3. A *stichidium.* 4. A *tetraspore.* 5. Longitudinal section of the frond. 6. Transverse section of the same:—the latter figures *magnified.*

Plate XLVIII.



Vincent Brooks

PLATE XXVIII.

RHODOMELA PERICLADOS, *Sond.*

GEN. CHAR. *Frond* terete, dendroid, inarticulate, solid, coated with minute polygonal cellules; the axis articulated, polysiphonous. *Fructification:* 1, ovate *ceramidia* containing a tuft of pear-shaped spores; 2, *tetraspores* lodged in swollen ramuli or in pod-like stichidia, in a single or double row.—RHODOMELA (*Ag.*), from ροδεος, *red,* and μελας, *black;* because these plants become darker in drying.

Frons teres, dendroidea, inarticulata, solida, cellulis minutis polygonis corticata; axi articulato polysiphonio. Fruct.: 1, *ceramidia ovata, sporas pedicellatas fasciculatas pyriformes foventia;* 2, *tetrasporæ triangule devisæ, in ramulis immersæ v. in stichidiis propriis evolutæ.*

RHODOMELA *periclados*; fronds tufted, subsimple or forked; branches few, lateral, simple; ramuli thorn-shaped, acute, short, at length multipartite, inserted on all sides; ceramidia subglobose, sessile or on short pedicels; tetraspores lodged in the multifid ultimate ramuli.

R. periclados, *cæspitosa; fronde subsimplici v. furcata, ramis paucis lateralibus simplicibus, ramulis aculeiformibus acutis brevibus demum fasciculato-multifidis undique insertis; ceramidiis subglobosis sessilibus v. brevissime pedicellatis; tetrasporis in ramulis fasciculatis ultimis nidulantibus.*

RHODOMELA periclados, *Sond. in Linnæa, v.* 26. *p.* 523.

RHODOMELA simpliciuscula, *Harv. Alg. Austr. Exsic. n.* 136.

HAB. On rocks and in rock-pools, near low-water mark. Brighton, Port Phillip, *Dr. Ferd. Mueller, W. H. H.* In Tasmania: on the east coast and at Brown's River, *Mr. Gunn;* South Port, *Mr. C. Stuart.*

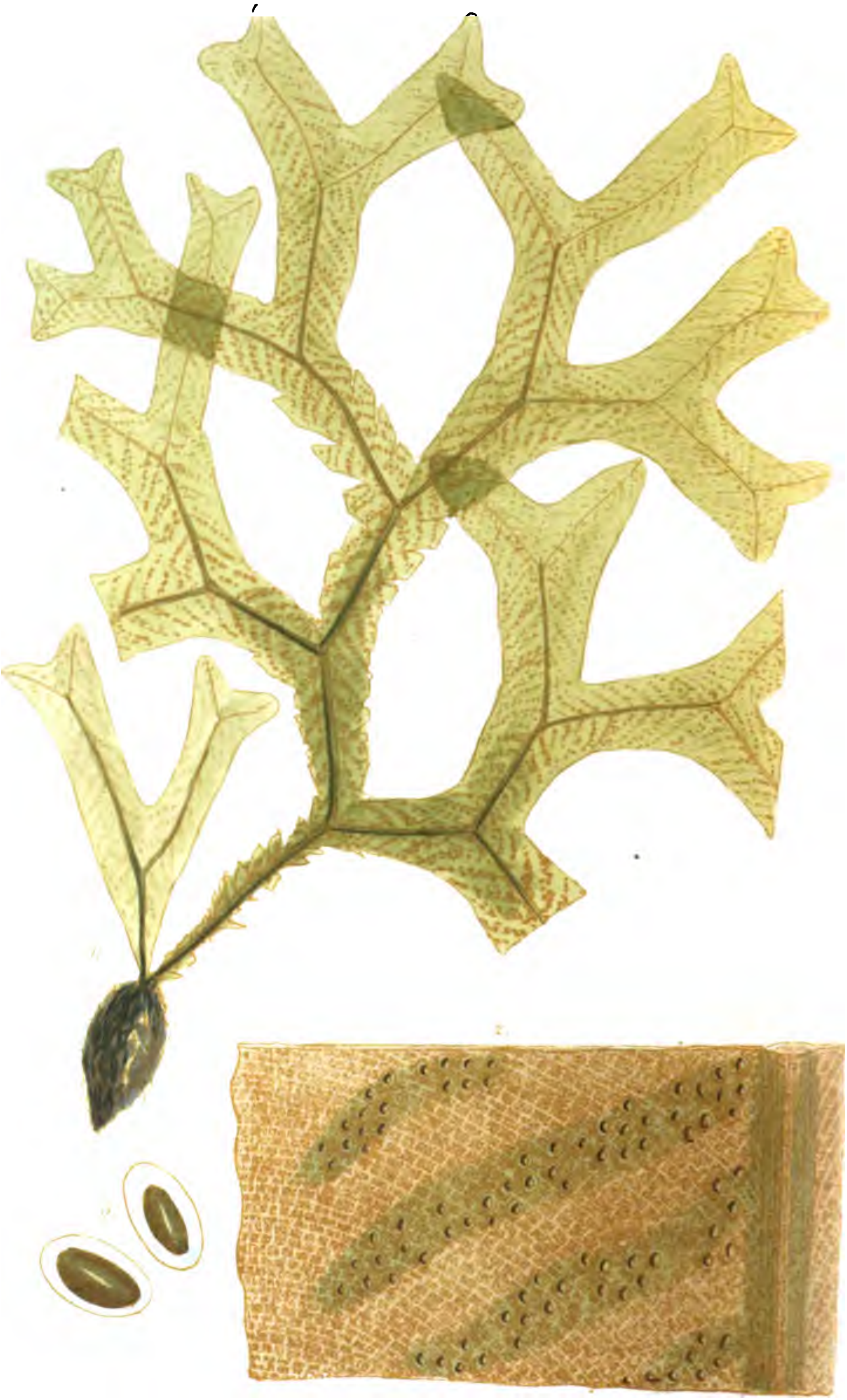
GEOGR. DISTR. As above.

DESCR. *Root* matted, branching. *Fronds* many from the same base, 4–5 inches high, either quite simple or once or twice forked, and now and then furnished with two or three lateral branches, filiform, as thick as a hog's bristle, naked below, ramuliferous above. *Ramuli* about two lines long, setaceous, subulate, inserted on all sides, crowded or scattered, at first quite simple, afterwards often irregularly multifid and somewhat corymbulose. The young ramuli are tipped with a pencil of soft, byssoid, articulated fibres. The frond is perfectly opaque in every part, and of densely cellular substance; the *axis* is four-tubed, the cells composing it being of small size. *Ceramidia* sessile or shortly stalked, borne on the sides of the ramuli. *Tetraspores* lodged in multifid ramuli, the plants bearing them being always distinguishable from the capsuliferous ones by the greater composition and abundance of their ramuli. *Colour* a dark brownish-purple, becoming brown or black in drying. *Substance* rather rigid. The plant imperfectly adheres to paper in drying.

When I named and distributed this little plant as *R. simpliciuscula*, I was not aware that my excellent friend Dr. Mueller had already communicated it to Dr. Sonder, by whom it is well described in the Linnæa, under the name now adopted. Dr. Mueller's and my specimens were probably collected from the same rocks, one of the ledges uncovered at low tides, on the strand, near the "Royal Hotel," at the Australian "Brighton." Those from different localities in Tasmania agree in most characters; but Mr. Stuart's specimens grow on the stems of *Cymodocea antarctica*, and slightly differ.

The structure of the stem may be compared to that of *Polysiphonia Hookeri*, but the cells are more closely pressed, smaller, the articulated axis less obvious, and there is no tendency to external articulation even in the smallest and youngest ramuli. The surface-cells in all parts of the opaque frond are minute and irregularly polygonal. The ramuli in capsuliferous specimens are always simple or nearly so; in those that bear tetraspores they are frequently multipartite and corymbose.

Fig 1. RHODOMELA PERICLADOS,—*the natural size*. 2. Part of a branch, with capsuliferous ramuli. 3. Apex of a ramulus, and ceramidium. 4. Tuft of spores. 5. Multifid ramulus, bearing tetraspores. 6. A tetraspore. 7. Cross section of the frond:—the latter figures more or less *magnified*.



Ser. MELANOSPERMEÆ. Fam. *Dictyoteæ.*

PLATE XXIX.

HALISERIS PARDALIS, *Harv.*

GEN. CHAR. *Root* coated with woolly hairs. *Frond* flat, linear, dichotomous, membranaceous, midribbed. *Fructification: spores* collected in naked *sori*, disposed in lines at each side of the midrib, and rising from both surfaces of the frond. *Paranemata* separate from the sporiferous sori, *articulate*, club-shaped.—HALISERIS (*Targ.*), from ἁλς, *the sea*, and σερις, *endive.*

Radix stuposa. Frons plana, linearis, dichotoma, membranacea, costata. Fruct., sporæ in soros nudos collectæ, in utraque pagina frondis sessiles. Paranemata in soris propriis evoluta, articulata, clavata.

HALISERIS *pardalis;* stipes short; frond with rounded axils, the segments very patent, linear, entire, repeatedly forked, somewhat wavy at the margin, obtuse; lamina delicately membranaceous, nerveless; sori disposed in recurved lines running obliquely from the midrib to the margin.

H. pardalis; *stipite brevi; fronde dichotoma, sinubus rotundatis, segmentis patentibus linearibus integerrimis repetite furcatis subundulatis obtusis; lamina tenui-membranacea enervi; soris dispositis in lineas recurvas e costa ad marginem oblique proficiscentibus.*

HALISERIS pardalis, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 535; *Harv. Alg. Austr. Exsic. n.* 86.

HAB. Cast ashore from deep water. Fremantle, Western Australia, *W. H. H.*, *G. Clifton, Esq.*

GEOGR. DISTR. As above.

DESCR. *Root* somewhat tuberous, densely clothed with brown, woolly hairs. *Fronds* 8–12 inches high, many times dichotomous, the principal stem, in old specimens, becoming more or less denuded of lamina, and frequently proliferous. *Stipes* covered with woolly hairs, short. *Segments* flabelliform, 4–6 times forked; the forks remarkably wide, with rounded axils; apices very obtuse. Lamina very thin and delicate, reticulated, without lateral veins; the midrib slender but well marked to the summits. *Sori* forming deflexed lines proceeding from the midrib to the margin, densely crowded, and giving a mottled, *pard-like* appearance to the fertile frond. *Spores* with wide perispores. *Paranemata* not observed. *Colour* a bright and rather yellowish olive, sometimes inclining to green. *Substance* soft. The frond in drying adheres to paper.

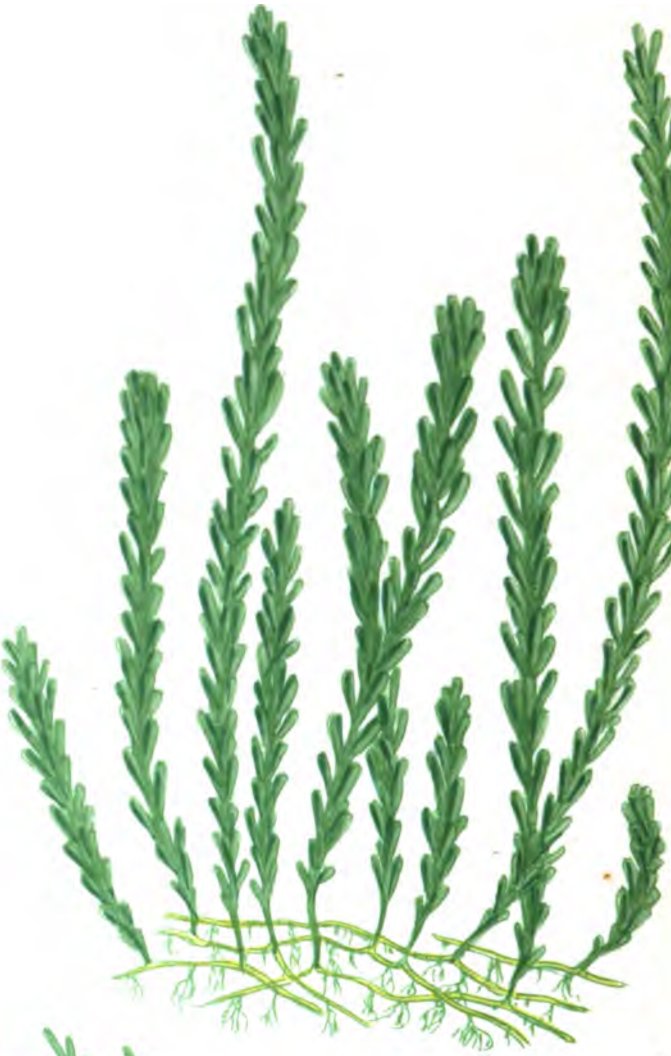
A beautiful species of *Haliseris*, and distinctly characterized by its bands of sori being disposed in recurved or deflected, transverse lines. When fully in fruit the lines of sori are so abundant that they remind one of a leopard's or, perhaps more correctly, a tiger's skin, a resemblance hinted at in the specific name. The frond, in old specimens, becomes more compound than our figure represents, but the size of our Plate necessitated the selection of a small specimen for illustration. The specific character is however equally obvious in small as in larger individuals.

As yet we have seen no specimens but those collected at Fremantle, where the plant is rather rare, occurring only in the drift after heavy gales, and is probably cast up from deep water.

The commonest Australian *Haliseris* has been named *H. Muelleri* by Sonder, and differs from the present species not only in size, habit, and tenacity of membrane and colour, but more essentially in the much effused, not lineated sori, which cover wide spaces of the frond. In a younger and barren state it is scarcely distinguishable from some forms of *H. polypodioides*, with which it was formerly confounded by me (*Alg. Tasm. in Hook. Journ.*).

A third Australian species (*H. australis*, Sond.) differs from both the preceding in having its very thin, wide lamina traversed with slender parallel veinlets, running obliquely from the midrib to the margin. It is very rare, and was discovered by Dr. Mueller at Cape Lefebre, South Australia.

Fig. 1. HALISERIS PARDALIS,—*the natural size.* 2. A portion of the lamina and midrib,—*magnified.* 3. Spores,—*more highly magnified.*



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Ser. CHLOROSPERMEÆ. Fam. *Siphonaceæ.*

PLATE XXX.

CAULERPA CYLINDRACEA, *Sond.*

GEN. CHAR. *Frond* consisting of prostrate *surculi* rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semi-fluid, grumous matter. *Fructification* unknown.—CAULERPA (*Lamour.*), from *καυλος, a stem*, and *ἑρπω, to creep;* creeping surculi are characteristic of this genus.

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membranâ continuâ hyalinâ intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fruct. ignota.

CAULERPA *cylindracea;* surculus filiform, glabrous; fronds erect, subsessile, linear, simple, imbricated throughout with lineari-clavate, obtuse, erecto-patent ramenta.

C. cylindracea; *surculo filiformi glabro; fronde erecta simplici lineari per totam longitudinem ramentis lineari-clavatis (vix "cylindraceis") obtusissimis erecto-patentibus imbricata.*

CAULERPA cylindracea, *Sond. in Pl. Preiss. v.* 2. *p.* 151. *Harv. Alg. Austr. Exsic. n.* 557.

CAULERPA lætevirens, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 563; *an Mont. Voy. Pôl. Sud, p.* 16. *t.* 6. *f.* 1? *Sylloge, p.* 452.

CHAUVINIA cylindracea, *Kütz. Sp. Alg. p.* 498.

AHNFELDTIA cylindracea, *Trevis. in Linn. v.* 22. *p.* 144.

Var. *β. macra;* surculi much developed; fronds short, with a few distant, subdistichous ramenta. (PLATE XXX. Fig. 2.)

Var. *β.* macra; *surculo elongato ramoso; fronde brevi tenui, ramentis paucis vage sparsis v. subdistichis.*

CAULERPA cylindracea, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 563. *Harv. Alg. Austr. Exsic. n.* 558.

HAB. Western Australia. Very abundant on the reefs at Rottnest Island. —VAR. *β.* At King George's Sound, *W. H. H.*

GEOGR. DISTR. Ins. Toud, *D'Urville.*

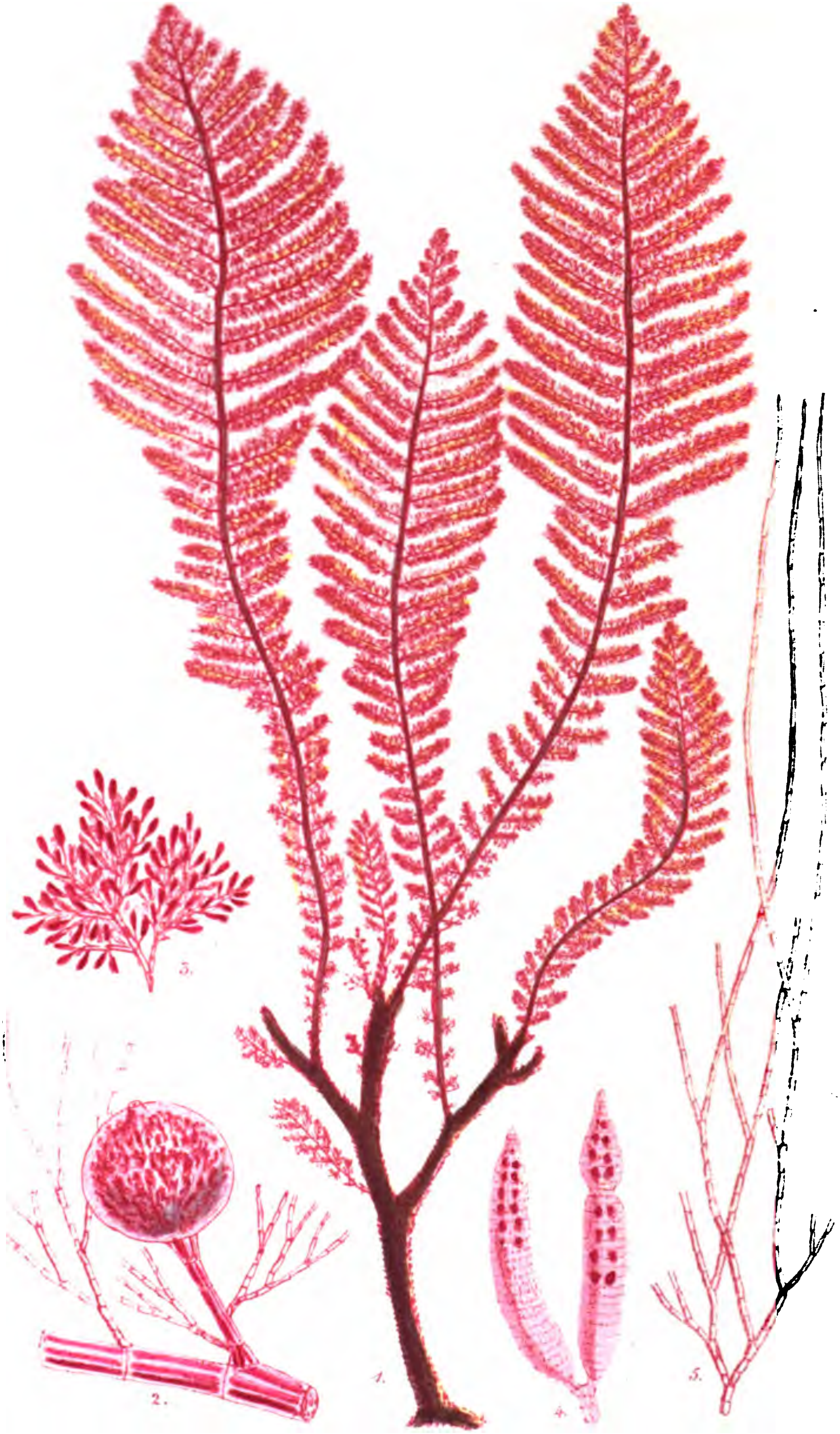
DESCR. *Surculi* forming a mat, several inches long and broad, filiform, twice as thick as hog's bristles, glabrous and glossy, shrinking when dry, with large and abundant roots. *Fronds* 3–6 inches long, erect, linear, either quite sessile or on a very short, scarcely obvious stipes, more or less densely imbricated throughout with tri-quadrifarious ramenta. *Ramenta* 2–3 lines long, at first nearly cylindrical, but becoming more or less distinctly linear-clavate, thickening at the very obtuse extremity. The *colour* is a peculiarly vivid and pleasant green, becoming darker and more olivaceous in the herbarium. The *substance* is rather soft and succulent, and in drying the frond adheres, though not strongly, to paper. Var. β differs from the common form chiefly in being depauperated, with shorter and more slender stems, and fewer and more distantly inserted ramenta.

An authentic specimen, communicated by Dr. Sonder, now enables me with confidence to refer the plant here figured to that author's *C. cylindracea.* I had previously associated it with *C. lætevirens*, Mont., and on now comparing my figure with that published by Montagne, there is so near an agreement that, allowing for differences of habitat, and of artists, I am still disposed to think the plants the same. I have not however seen any authentic specimen of Dr. Montagne's species. He represents the ramenta as more densely imbricated, and rather longer, and perhaps a shade more club-shaped than I find them. But my specimens differ as much in these respects from each other as do Montagne's and my figures. This plant is excessively common on all the reefs at Rottnest Island, growing in shallow, exposed tide-pools, as well as in sheltered spots below low-water mark, and it varies much in luxuriance according to the locality.

As a species it is obviously nearly related to the protean *C. clavifera,* but appears to be sufficiently distinct.

Fig. 1. CAULERPA CYLINDRACEA; and fig. 2, the var. β,—both of the *natural size.* 3 and 4. Ramenta, of different ages,—*moderately magnified.*

Plate XVI



Vincent Brooks I

PLATE XXXI.

DASYA MUELLERI, *Sond.*

GEN. CHAR. *Frond* filiform or compressed, dendroid; stem and branches coated with small, polygonal cells (rarely articulated and many-tubed); the axis articulate, composed of numerous radiating cells surrounding a central cavity; ramelli articulated, one-tubed. *Fructification:* 1, ovate or urceolate *ceramidia;* 2, lanceolate *stichidia,* attached to the ramelli, and containing triangularly-parted tetraspores in transverse rows.—DASYA (*Ag.*), from δασυς, *hairy.*

Frons filiformis v. compressa, dendroidea. Caulis ramique majores strato cellularum corticati (raro pellucide articulati) ramellis monosiphoniis obsessi; axis articulatus, ex cellulis pluribus radiantibus tubum centralem cingentibus formatus. Fruct.: 1, *ceramidia ovata v. urceolata;* 2, *stichidia lanceolata, ex ramellis enata, tetrasporas transversim ordinatas foventia.*

DASYA *Muelleri;* stem elongate (a foot or more in length), robust, densely hairy, subdichotomous; secondary branches very long (1–2 feet), much more slender than the stem, glabrous, corticated, simple, often naked below, plumoso-pinnated above; pinnæ alternate, close, horizontal, subarticulate, pinnulate; pinnules very short, few-tubed, ramelliferous; ramelli dichotomous, attenuated, obtuse, their articulations 2–4 times longer than broad; ceramidia large, pedicellate, inflated, with a prominent orifice; stichidia minute, linear-oblong, acute at each end.

D. Muelleri; *caule elongato (pedali et ultra) crasso villoso subdichotomo; ramis secundariis longissimis (*1–2*-pedalibus) caule multo tenuioribus glabris corticatis simplicibus inferne sæpe denudatis superne pulcherrime plumoso-pinnatis; pinnis alternis crebris horizontalibus plus minus ecorticatis polysiphoniis iterum pinnulatis; pinnulis oligosiphoniis brevissimis ramelliferis; ramellis dichotomis attenuatis obtusis, articulis diametro* 9–4*-plo longioribus; ceramidiis magnis pedunculatis inflato-ovatis, ore prominulo; stichidiis minutis oblongis acutis.*

DASYA Muelleri, *Sond. in Linn. v.* 26. *p.* 525.

DASYA plumigera, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 543; *Alg. Austr. Exsic. n.* 208.

HAB. On the western and southern shores of Australia; particularly abundant and of large size in King George's Sound, *W. H. H.* Mouth of Glenelg River, *Dr. Curdie* (1850). Port Phillip, *Dr. F. Mueller* (1852). Coast of Tasmania, *Mr. Gunn, W. H. H.*

GEOGR. DISTR. As above.

Descr. *Root* a thick, villous mass. *Primary frond* perennial, 2–6 inches to a foot or more in length, 1–2 lines in diameter, shaggy with dark-red woolly hairs, irregularly divided or dichotomous, its branches widely spreading. This primary frond emits an annual crop of deciduous, slender, glabrous *branches*, one or two feet long, and either simple or emitting laterally from a main rachis, several similar, long, simple branches. The branches of either series are generally denuded at base, and closely pinnated above with horizontal pinnæ, which are from ½–1 inch long, the older ones becoming pinnulate. Both pinnæ and pinnulæ are clothed with very slender, dichotomous, rose-red, soft ramuli. The *ceramidia* are as large as rapeseed, much inflated, with a prominent orifice; the *spore-filament* is excessively branched, resembling a miniature tree, loaded with innumerable pear-shaped spores, and nearly fills up the cavity of the pericarp. The *stichidia* are of small size, and clustered. The *colour*, when quite fresh, is a beautiful, clear rosy-red or crimson, but old specimens are frequently brownish-red. The *substance* of the primary stem is rigid, that of the branches very soft and flaccid. The plant adheres closely to paper in drying.

With every respect for my friend Dr. Mueller, I am sorry to be compelled, in obedience to the law of priority, to alter the specific name of this plant; and I am sure that Dr. Mueller will share in the regret when he knows that this beautiful species was first detected by our mutual friend Dr. Curdie, to whom therefore properly belongs the honour of discovery. It was through my fault, in not having more promptly published the results of Dr. Curdie's explorations at the Glenelg, that the confusion has arisen. Recent explorations of the Australian coast have shown that *D. Muelleri* is a very widely-dispersed and abundant species. Our figure represents a small and comparatively simple specimen: the plumes are frequently again compounded.

Fig. 1. DASYA MUELLERI,—*the natural size.* 2. Portion of a pinnule, bearing a ceramidium. 3. A branch from the decompound (dendroid) placenta, bearing spores. 4. A pair of stichidia. 5. Portion of a *ramellus*, some of its furcations excised, from want of space:—the latter figures *magnified.*

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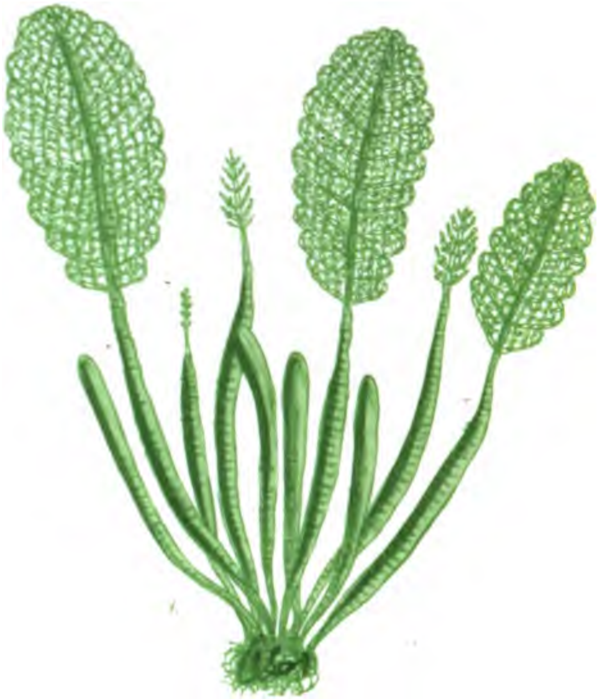
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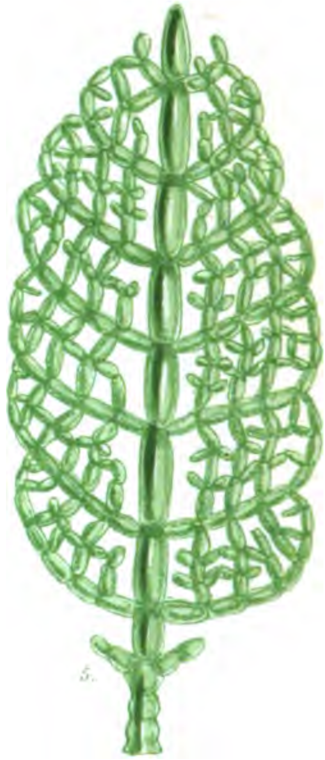
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PLATE XXXII.

STRUVEA PLUMOSA, *Sond.*

GEN. CHAR. *Frond* stipitate, flabelliform. *Stipes* rooting, unicellular and monosiphonous, transversely rugulose, thinly coated with calcareous matter, at maturity crowned with an oblong, midribbed, open network, composed of anastomosing, pinnately decompound, articulated, confervoid filaments. *Endochrome* bright-green, thin and watery.—STRUVEA (*Sond.*), in honour of H. de Struve, Ambassador from Russia to the Hanseatic Towns, and a patron of Natural History.

Frons stipitata, flabelliformis. Stipes radicatus, monosiphonius, continuus, annulatim constrictus et transversim rugulosus, epidermide tenui calcarea donatus, in ætate majori reticulo flabelliformi oblongo costato coronatus. Reticulum ex filis confervoideis articulatis disticke pinnatis anastomosantibus evolutum. Succus aquosus, viridis.

STRUVEA *plumosa;* network (1–2 inches long) oblong-oval, crenate, its filaments 2–3 times pinnated; articulations of the pinnæ twice or thrice, of the pinnules once and half as long as broad.

S. plumosa; *flabello oblongo-ovali (*1–2 *uncias longo) crenato, filis anastomosantibus* 2–3-*pinnatis; articulis pinnarum diametro* 2–3-*plo, pinnularum sesqui-longioribus.*

STRUVEA plumosa, *Sond. Pl. Preiss. v.* 2. *p.* 151. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 564.

HAB. On reefs, at low-water mark. Western Australia: at Garden Island, *Preiss;* Rottnest, *W. H. H., G. Clifton.*

GEOGR. DISTR. As above.

DESCR. *Root* much branched, fibrous, matted. *Fronds* densely tufted. In an early stage the plant consists of a single, lineari-clavate, very obtuse cell, transversely corrugated in its lower half, smooth above, composed of a hyaline membrane, and filled with bright-green, watery endochrome. At this stage it is 1–1½ inches high, and it grows to nearly two inches in length before undergoing change. At length the apex lengthens, and becomes attenuated to a slender point, and corrugated like the lower half, and then a new cell is formed at the summit of what must now be called the *stipes.* This apical cell is the commencement of the network, or basal cell of the rachis or midrib. From it are developed a series of cells, one above the other, to the number of ten or twelve, and each of these emits from its shoulders a pair of opposite pinnæ, which are at first free and pectinate; but afterwards, becoming once and again pinnulate, their pinnulæ anastomose, and form the network of the fully developed frond. Specimens of different ages, showing all these changes, may generally be found, and some of them are represented in our figures (2, 3, 4, 5). The ***network***, when fully formed, is from an inch to an inch and a half in length, rarely more, and from half to three-quarters of an inch wide, of an oblong or oval outline, obtuse at each end, and crenulate at the margin. The cells of the rachis are cylindrical, about thrice as long as broad; those of the pinnæ are somewhat clavate, shorter in proportion to their width, and those of the pinnules scarcely longer than broad. All the nodes are contracted. The stipes, in age, becomes coated with calcareous matter. The ***colour*** of the network and of the young stipes is of a brilliant grass-green. The ***substance*** is soft and juicy, but the plant does not strongly adhere to paper in drying. No fructification has been observed.

* * *

At Plate VII. is represented the only other species of *Struvea* yet known to botanists, and the differences can readily be seen by comparing the two figures. In the present Plate some of the various stages through which the frond passes in advancing to maturity are shown in the lower figures. By comparing these with similar stages in the development of *Apjohnia lætevirens* (Plate V.), the close relationship of these Algæ will be apparent. In an early stage of growth, the *Struvea*, as the *Apjohnia*, consists of a single, club-shaped, corrugated cell; and the first change in either is by the development of a minute cellule, of a different character, at the apex of the first cell. In each case this cellule becomes the basis of the characteristic portion of the frond; but in one, the *Apjohnia*, it grows into a dendroid crown of trichotomous branches, and in the other, the *Struvea*, it developes a flat network.

I regret that many of the duplicates of this plant distributed by me are immature, the plant not having been quite in season at the time of my visit to its only known locality.

Fig. 1. A tuft of STRUVEA PLUMOSA, consisting of fronds of different ages,—*the natural size*. 2, 3, 4, and 5. Apices of young and older fronds:—*magnified*.

Plate XXII.

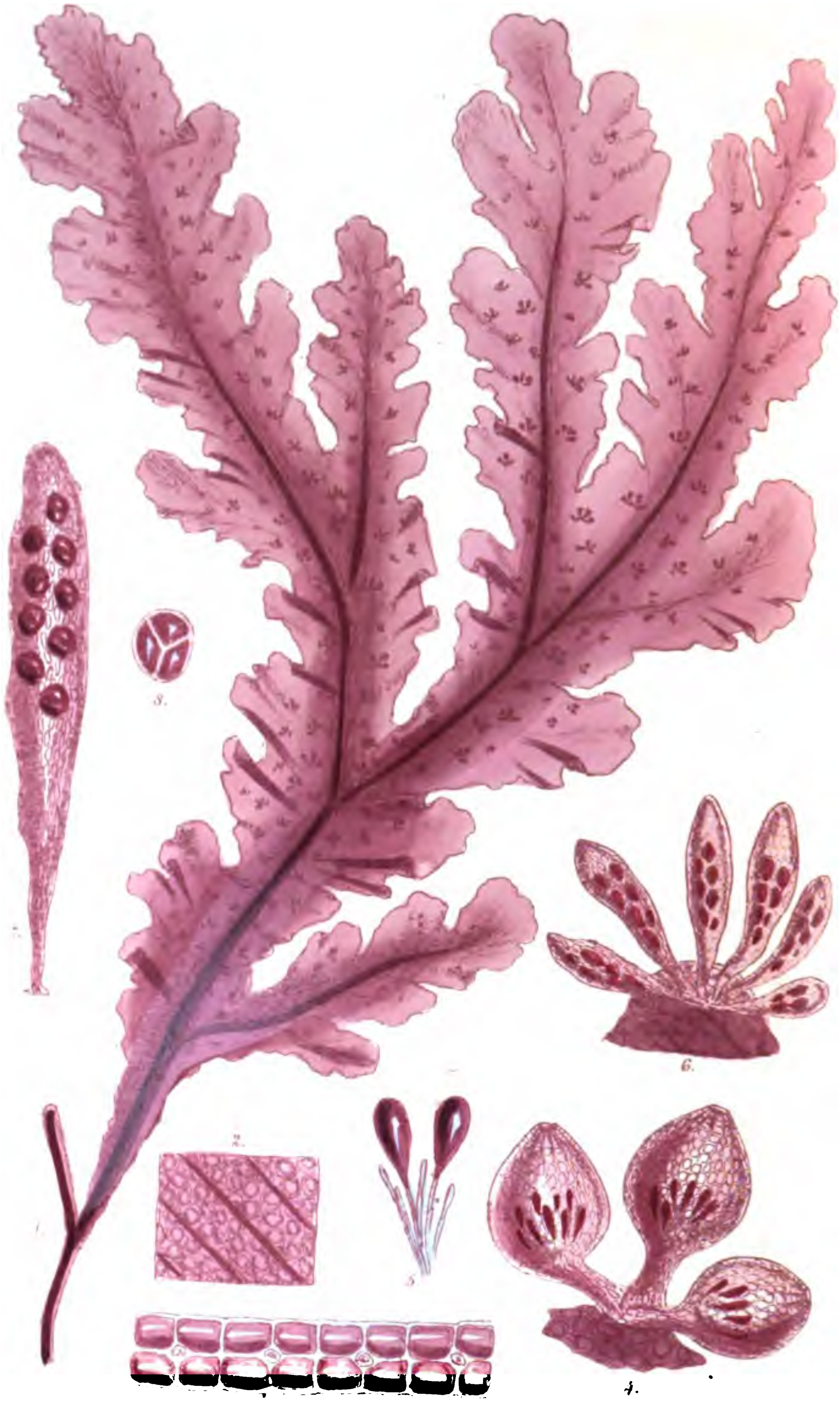

PLATE XXXIII.

JEANNERETTIA LOBATA, *H.f. et H.*

GEN. CHAR. *Frond* leaf-like, proliferous. *Phyllodia* flat, membranaceous, multilobate, with a branching midrib vanishing upwards; the membrane areolate, formed of a double stratum of quadrate cells, and traversed by slender internal veinlets proceeding obliquely from the midrib to the margin. *Fructification,* of both kinds, dispersed in superficial tufts: the 1st, ovate, pedicellate *ceramidia,* containing pear-shaped spores; the 2nd, lanceolate *stichidia,* containing tripartite tetraspores.—JEANNERETTIA (*H.f. et H.*), in honour of Dr. Jeannerett, an investigator of the Botany of Tasmania.

Frons foliacea, prolifera. Phyllodia plana, membranacea, multilobata, costâ ramosâ supra evanescente instructa; membrana areolata, e duplici strato cellularum quadratarum formata, venulisque tenuissimis internis e costa ad marginem oblique proficiscentibus percursa. Fruct. utriusque generis in fasciculis superficialibus dispersus: 1, *ceramidia pedicellata;* 2, *stichidia propria, lanceolata.*

JEANNERETTIA *lobata,* Hook. fil. et Harv.

JEANNERETTIA lobata, *H.f. et H. in Harv. Ner. Austr. p.* 20. *t.* 4. *Sond. in Linn. v.* 25. *p.* 697. *Harv. Alg. Austr. Exsic. n.* 125.

JEANNERETTIA frondosa, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 537 (*the young plant*).

BOTRYOGLOSSUM lobatum, *Kütz. Sp. Alg. p.* 881.

DELESSERIA lobata, *Lamour. Ess. p.* 36. *t.* 2. *f.* 5–7 ? (*fide Kütz.; sed vix quoad fructum delineatum*).

HAB. On the western and southern coasts of Australia: from Swan River to Bass's Straits. Tasmania. Not uncommon.

GEOGR. DISTR. As above.

DESCR. *Root* small, discoid. *Fronds* tufted, 1–2 feet long, and as much in the expansion of the segments, rising with a filiform, slender *stem,* which at an inch or two above the root passes into the base of the frond, and is continued upwards as a midrib. This *midrib* sends off lateral branches, one of which traverses each lobe of the frond until it is lost near the apex; and the larger branches throw out other laterals, directed towards the smaller lobes. The *frond* is delicately membranous, but of firm and somewhat rigid substance, and is subdichotomously divided; the lesser segments alternately inciso-pinnatifid, or lobulate. The margin is everywhere undulated, and the lobes are all remarkably obtuse. In old specimens the midrib is proliferous, emitting similar fronds. Under a pocket-lens the lamina appears to be obliquely striate from the midrib to the margin, and especially at the apices of the laciniæ it is marked with radiating striæ; these striæ are internal veinlets, forming part of the axial system of the membrane. The membrane is composed of a double row of quadrate cells; the midrib of several rows of similar but smaller cells. ***Fructification***, of both kinds, is abundantly scattered over both surfaces of the membrane in fertile specimens. The ***ceramidia*** are tufted, pedicellate, ovate, and contain a tuft of pedicellate, pyriform spores. The ***stichidia***, also tufted, are fusiform or clavate, simple, and contain a double row of tetraspores. The ***substance*** is firmly membranous, the surface glossy when dry, and the frond generally adheres to paper in drying. The ***colour*** is a dark vinous-purple, which changes to brown or black in drying, and can only be partially preserved by repeated washing and maceration in fresh-water.

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At the time the figure in 'Nereis Australis' was published, I had seen only very imperfect specimens of this plant, and was only acquainted with the tetrasporic fruit. My recent visit to Australia has furnished me with abundant specimens in all stages of growth and decay; and some of these are so different from the earlier examples, that I was led into error in publishing as a new species, what I now consider to be merely a luxuriant form of the young plant. Different specimens differ considerably in the strength and definition of the midrib, and in the breadth and composition of the lamina. The figure now given may be considered characteristic of the usual form of the species.

As a genus, *Jeannerettia* is very nearly related to *Pollexfenia*, and differs from it exactly as *Delesseria* differs from *Nitophyllum*, namely, by having a midrib and a symmetrical frond.

Fig. 1. JEANNERETTIA LOBATA,—***the natural size*** (a branch only). 2. Small portion of the membrane, viewed vertically. 3. A section of the same. 4. Clustered *ceramidia*. 5. Spores, from the same. 6. Clustered ***stichidia***. 7. A ***stichidium***, more enlarged. 8. A tetraspore:—the latter figures more or less ***magnified***.
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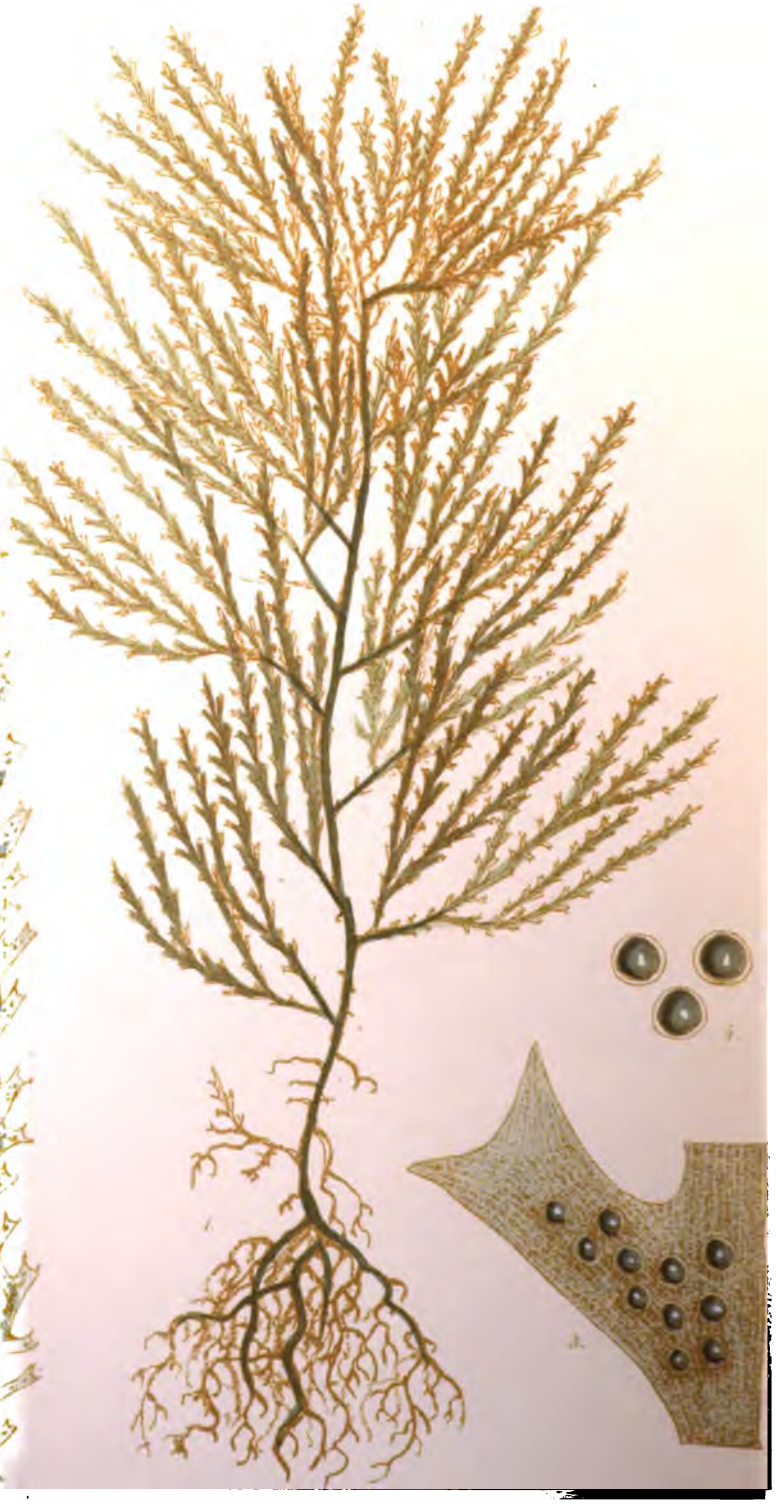
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PLATE XXXIV.

LOBOSPIRA BICUSPIDATA, *Aresch.*

GEN. CHAR. *Stem* with a branching root, cartilaginous, compressed, alternately branched; branches costate below, linear, pinnatifid, the segments bicuspidate. *Spores* scattered over the surface of the segments, prominent, each contained in a hyaline perispore.—LOBOSPIRA (*Aresch.*), from λοβος, *a lobe*, and σπειρα, *a twist;* from the spirally twisted branches of the only known species.

Caulis basi radicans, cartilagineus, tereti-compressus, alterne ramosus; rami inferne costati, lineares, pinnatifidi, lacinulis bicuspidatis. Sporæ per superficiem laciniarum sparsæ, prominentes, intra perisporum hyalinum singulæ nidulantes.

LOBOSPIRA *bicuspidata*, Aresch.

LOBOSPIRA bicuspidata, *Aresch. Phyt. Nov. p.* 38 (*fide Sond. in litt.*).

METACHROMA thuyoides, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 535; *Alg. Austr. n.* 75.

HAB. On sand-covered rocks, about low-water mark. Fremantle, Western Australia, *G. Clifton*. Middleton Bay, K. G. Sound, and Cape Riche, abundantly, *W. H. H.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* fibrous, much and diffusely branched, deeply descending into the sand, or grasping on neighbouring objects. *Fronds* tufted, 6–18 inches high, much branched, and bushy, the branches directed to all sides. *Stem* cylindrical or somewhat compressed, especially in its upper part, cartilaginous, about as thick as small twine, generally continued undivided throughout the frond, sometimes forked, closely set throughout with patent lateral branches. These *branches* are 2–4 inches long, slender, flat, furnished with a midrib which is strongly marked in the lower half of the branch, and gradually fades away towards the summits, and are alternately or subdichotomously divided. The ultimate divisions are linear, spirally twisted, and alternately pinnatifid; the pinnules not the tenth of an inch in length, bicuspidate or sharply bidentate, with rounded axillæ. The *membrane* is areolate, with quadrate cells, which converge towards the apices of each terminal tooth of the pinnule. The *spores* (or antheridia?) are hemispherical, and form diffused sori on each pinnule of fertile specimens. The *substance*, when growing, is crisp, brittle, and somewhat cartilaginous; when dry it is rather rigidly membranous, and the frond does not adhere to paper in drying. The *colour*, when growing, is a clear greenish-olive, but on exposure to the air or immersion in fresh-water it rapidly changes to bright verdigris; the olive, but darker in tone, returning in the dried specimen.

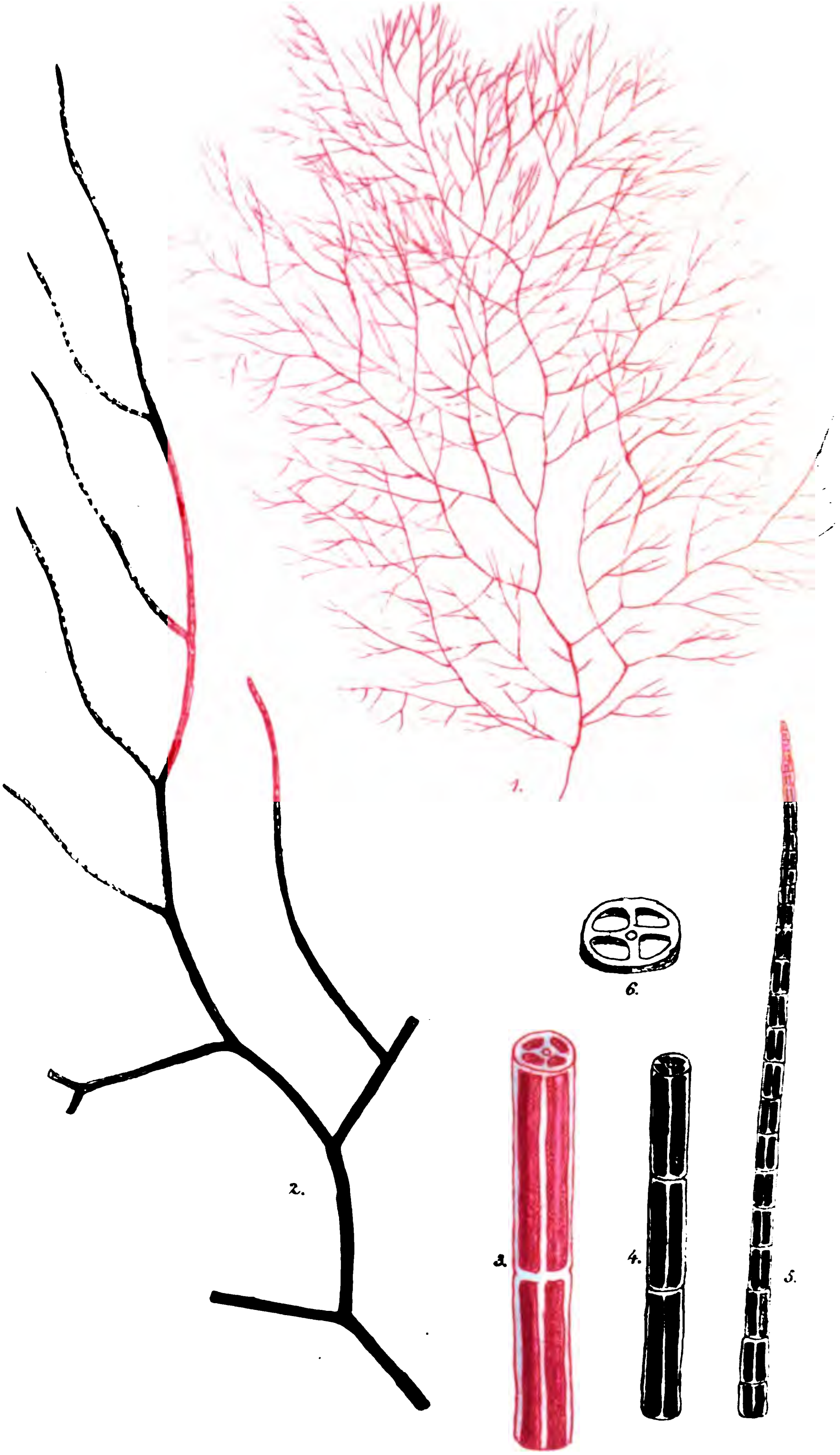
The name *Metachroma*, proposed by me for the plant here figured, must yield to the one now adopted from Areschoug, and which has the right of priority by some few months, as I understand from a letter from my friend Dr. Sonder, for I have not yet received Professor Areschoug's memoir above quoted. "*Metachroma*" was intended to allude to a remarkable change of colour observed in the living plant, similar to what takes place in *Sporochnus*, but not so permanent; for here the olive returns after the specimen is dried, and subsequent moistening does not bring back the verdigris-green.

Lobospira is readily distinguished from *Dictyota* by the presence of a valid nerve, and by the cartilaginous stem and pinnatifid (subdichotomous) habit. When growing, it has more the aspect of a small *Cystoseira* than of a Dictyoteous plant.

I am not aware of the locality of Areschoug's specimens, and only myself collected this Alga in Western Australia, where it is very common, though hitherto overlooked.

Fig. 1. LOBOSPIRA BICUSPIDATA,—*the natural size*. 2. One of the ultimate, spirally twisted, pinnatifid branchlets. 3. A fertile pinnule, with a *sorus*. 4. A spore:—the latter figures variously *magnified*.

Plate XXVI.



Vincent Brooks Imp.

PLATE XXXV.

POLYSIPHONIA ROEANA, *Harv.*

GEN. CHAR. *Frond* filiform, partially or generally articulate; the joints longitudinally striate, composed of numerous cylindrical cells surrounding a central cell (sometimes coated with one or several rows of smaller cells). *Fructification:* 1, ovate or urceolate *ceramidia*, containing a tuft of pear-shaped spores; 2, *tetraspores*, immersed in swollen branches.—POLYSIPHONIA (*Grev.*), from πολυς, *many*, and σιφων, *a tube.*

Frons filiformis, plus minus articulata; articulis longitudinaliter pluristriatis ex cellulis 4–20 *cylindraceis cellulam centralem cingentibus formatis (nunc cellulis minoribus pluriseriatis corticatis). Fruct.:* 1, *ceramidia;* 2, *tetrasporæ in ramulis ultimis uniseriatæ.*

POLYSIPHONIA *Roeana;* rose-red; fronds (3–6 inches long) tufted, capillary, soft, decompoundly much branched; branches alternate, often subsecund, many times divided; ultimate ramuli filiform, elongate, scattered, all very patent; axils very wide; articulations 4-tubed, the lower 4–6 times, the upper twice, those of the ramuli 1–1½ as long as broad.

P. Roeana; *punicea; frondibus* (3–6-*uncialibus*) *cæspitosis capillaribus mollibus (chartæ arcte adhærentibus) decomposite ramosissimis; ramis alternis sæpe subsecundis pluries divisis; ramulis ultimis filiformibus elongatis sparsis omnibus eximie patentibus; axillis latissimis; articulis pellucide* 4-*siphoniis, inferioribus diametro* 4–6-*plo, superioribus subduplo, ramulorum sesqui-longioribus.*

POLYSIPHONIA Roeana, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 540; *Alg. Exsic. Austr. n.* 169.

HAB. Dredged off Fremantle, Western Australia, *W. H. H.* and *G. Clifton, Esq.* (1854).

GEOGR. DISTR. Not known elsewhere.

DESCR. *Root* discoid. *Fronds* tufted, 3–6 inches long, finer than human hair (too coarsely drawn in our figure), excessively and very irregularly branched, in a manner between dichotomous and alternate. The primary divisions are properly dichotomous, but from frequent suppression of one arm of the fork the filament becomes irregularly zigzag; the secondary branches are either alternate or very commonly secund, and are repeatedly compounded in an irregularly forking or secund order. The main branches are not much more robust than their divisions, and the lesser ones taper very gradually to a point, the ultimate ramuli being about half the diameter of the branches.

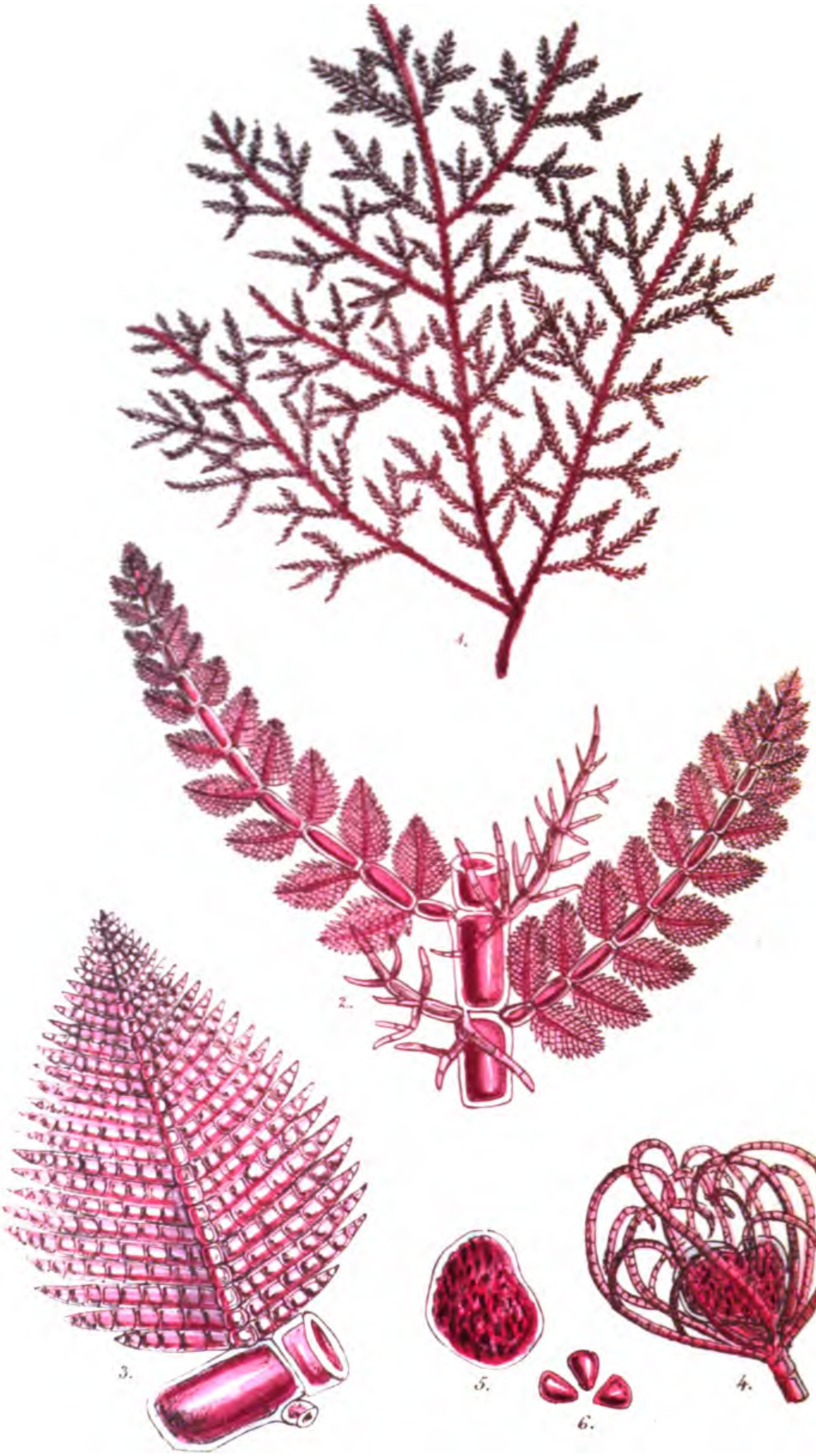
The *articulations* are pellucid in all parts of the frond, and composed of four tubes surrounding a minute cavity; the lower ones are several times as long as broad, the upper gradually shorter, and the ultimate ones scarcely exceed their breadth. No *fruit* has yet been observed. The *colour* is a beautifully brilliant rosy-red, well preserved in drying, in which state the plant adheres firmly to paper. The *substance* is soft and very flaccid, but not gelatinous, and the frond does not rapidly decompose in fresh-water.

* * *

This delicate little species of *Polysiphonia*, which is not done justice to in our figure, being represented somewhat coarser than nature, was dredged in considerable plenty by Mr. Clifton and myself in June, 1854, in the anchorage off the mouth of the Swan River. I have not detected it elsewhere, nor received it from correspondents, and am unacquainted with its fruit. It appears to be most related to the European *P. formosa*, or to the Antarctic *P. abscissa* (recently found in Tasmania), but differs from both sufficiently in ramification, etc. The specific name is bestowed in honour of J. S. Roe, Esq., R.N., Surveyor-General of Western Australia, in which capacity he has explored many distant portions of the Colony; and, though not a botanist, never neglects an opportunity of promoting botanical researches. I was much indebted to his kindness during my visit to Western Australia.

Fig. 1. POLYSIPHONIA ROEANA,—*the natural size.* 2. Part of a small branch, with ramuli. 3. Two of the lower joints. 4. Upper joints. 5. End of a ramulus. 6. Cross section of the frond:—the latter figures more or less *magnified.*

Plate [illegible]



Vincent Brooks Imp.

PLATE XXXVI.

BALLIA ROBERTIANA, *Harv.*

GEN. CHAR. *Frond* filiform, rigid, dendroid; the stem and branches covered with a plexus of hair-like, short fibres; ramuli pellucidly articulate, pinnately decompound. *Fructification:* 1, involucrate *favellæ* terminating short pinnæ, and containing numerous angular spores; 2, *tetraspores*, borne on the hair-like fibres of the stem and branches. —BALLIA (*Harv.*), in honour of Miss Anne E. Ball, a distinguished Irish algologist.

Frons filiformis, rigida, dendroidea; caulis ramique plexu filorum brevium quasi hirsuti; ramuli pellucide articulati, pinnatim compositi. Fruct.: 1, *favellæ involucratæ in pinnula abbreviata terminales, sporas numerosas angulatas foventes;* 2, *tetrasporæ triangule divisæ, in filis caulinis evolutæ.*

BALLIA *Robertiana;* penultimate branchlets (or *plumules*) incurved, oblong, opposite, but alternately very unequal; one very minute, pinnate or vaguely ramulous, with curved ramuli; the other elongate, bipinnate, the pinnæ oval in outline, pinnules opposite, incurved, very close.

B. Robertiana; *plumulis incurvis oblongis oppositis inter se alterne valde inæqualibus; una pusilla pinnata v. vage multifida ramulis inflexis; altera elongata bipinnata basi (demum) ramulis incurvis vage divisis fructiferis stipata, pinnis ambitu ovatis, pinnulis oppositis incurvis creberrimis.*

BALLIA Robertiana, *Harv. in Tayl. An. Nat. Hist. for May*, 1855; *Alg. Exsic. Austr. n.* 500.

CALLITHAMNION ballioides, *Sond. in Linn. v.* 25. *p.* 674.

HAB. Thrown ashore from deep water. Guichen Bay, *Dr. F. Mueller.* Port Fairy, *W. H. H.* South Port, V.D.L., *Mr. C. Stuart.*

GEOGR. DISTR. Shores of South Australia, and Victoria. Tasmania.

DESCR. *Root* an expanded disc. *Fronds* tufted, 3–6 inches long, distichous, decompound-pinnate, the main branches and all their lesser divisions opposite, patent, subdistant. The stem and branches are everywhere densely clothed with short, rigid, incurved, irregularly ramulose, hair-like filaments, which throw out rootlets that are woven together round the branches in an inextricable plexus. The ends of the larger branches and all the smaller ones are pellucidly articulate, the articulations cylindrical, not contracted at the joints or obovate (as in *B. callitricha*), and are distichously plumulate throughout; the plumules, at first sight, appear to be alternate, and if we limit the name to the bipinnate ramuli, they certainly are so; but opposite to each will be found a minute, more or less pinnated ramulus, which must be regarded as an abortive plumule. It is more correct, therefore, to describe the plumules as being alternately dissimilar; one of each pair alternately reduced to a ramulus, the other elongate. The elongate plumule is about the tenth of an inch in length, slightly incurved, and regularly, oppositely bipinnate. The articulations of its rachis are cylindrical, and three to four times longer than broad; its ovate pinnæ are so closely pinnulated that the parallel pinnules touch each other through almost their whole length, and the pinna looks like a leaflet. The articulations of the pinnules are about as long as broad, and quadrate. *Tetraspores* are borne on the stuppose fibres of stem and branches. *Favellæ*, surrounded by numerous inrolled, elongate, branched, involucral ramuli, are borne on shortened branches. The *colour* is a deep, dark brownish-red, fading, on exposure, to dull olive-green or yellowish-white. The *substance* is rigid, and the plant scarcely adheres to paper in drying.

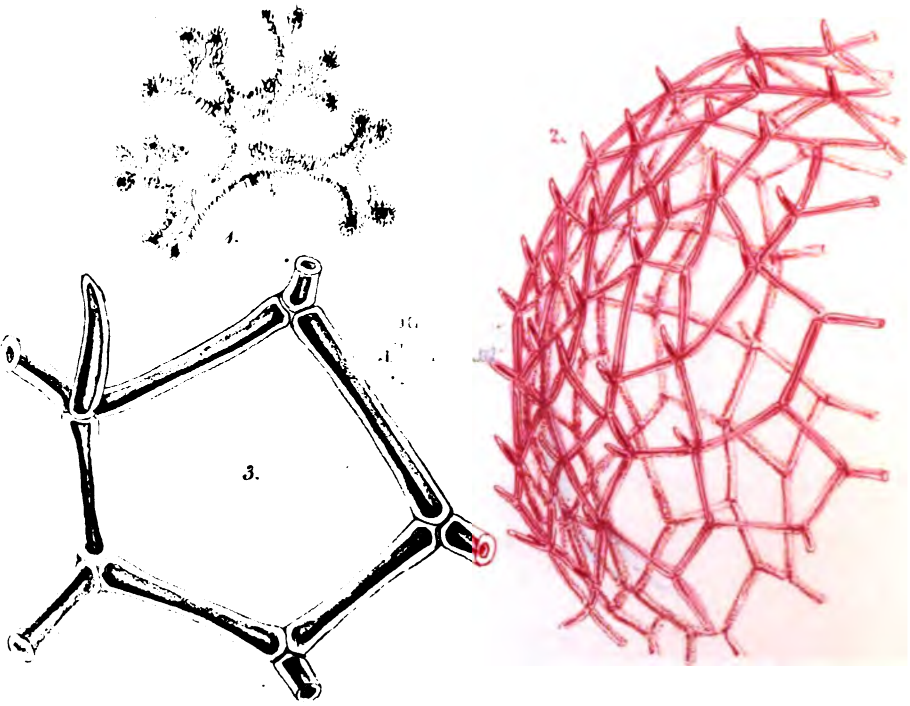
When, half in sport and half "*honoris causâ*," I gave the name of a dear friend to the new species of *Ballia* here figured, I little anticipated that before I should have an opportunity of publishing this figure, he to whom it is dedicated would have been numbered with the dead. Those who knew the late Robert Ball, LL.D. (and what British naturalist does not know him, at least by fame?), will not wonder that his intimate friends should cherish his memory as one of the fondest recollections of their past lives. To me his loss is greater than to most others, for he was one of my earliest scientific friends and instructors, and for thirty-two years our friendship was unbroken.

The genus *Ballia* was founded in 1840, in honour of Dr. Ball's sister, and now includes at least four well-marked species, all natives of the southern hemisphere. *B. callitricha*, Ag. (*B. Brunonis*, Harv.), the first named species, is widely dispersed; the others are more local.

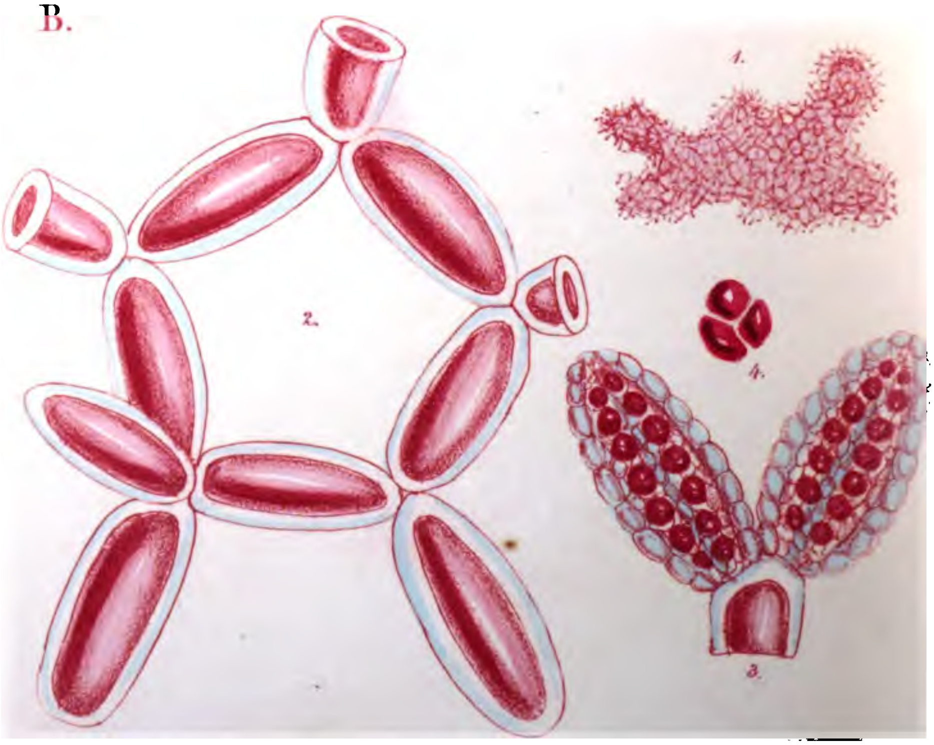
Fig. 1. BALLIA ROBERTIANA,—*the natural size*. 2. Two pairs of opposite, "alternately unequal" plumules. 3. A pinna, from one of the major plumules. 4. An involucre containing a favella. 5. The *favella*, removed. 6. Spores from the same:—the latter figures more or less *magnified*.

Plate XXVII

A.



B.



Vincent Brooks, lith.

Plate XXXVII. A.

HALODICTYON ARACHNOIDEUM, *Harv.*

Gen. Char. *Frond* a tubular (simple or forked) network, formed by numerous, inosculating, confervoid filaments; the meshes irregular, emitting at the angles, free, horizontal ramelli. *Fructification:* 1, urceolate *ceramidia*, containing a tuft of pear-shaped spores; 2, lanceolate *stichidia*, containing a single or double row of tetraspores.—Halodictyon (*Zanard.*), from ἁλς, *the sea*, and δικτυον, *a net.*

Frons (quasi reticulum tubulosum, simplex v. furcatum) ex filis confervoideis numerosis angulatim anastomosantibus conflata; maculis irregularibus, ramellos horizontales breves ad angulos emittentibus. Fruct.: 1, *ceramidia urceolata, fasciculum sporarum pyriformium includentia;* 2, *stichidia lanceolata, tetrasporas triangule divisas uni-biseriatas foventia.*

Halodictyon *arachnoideum;* network compressed, repeatedly forked; filaments arachnoid, the primary articulations cylindrical, 6–8 times as long as broad.

H. arachnoideum; *reticulo compresso dichotomo; filis arachnoideis, articulis primariis cylindraceis diametro* 6–8-*plo longioribus.*

Hanowia arachnoidea, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 558; *Alg. Austr. n.* 116.

Hab. Dredged in 6–8 fathoms. King George's Sound; very rare, *W. H. H.*

Geogr. Distr. As above.

Descr. *Network* 1–2 inches long, at first decumbent, spreading vaguely over other Algæ; afterwards throwing up erect or ascending branches, which are at first simple, then forked, and finally repeatedly dichotomous. All the *axils* are remarkably obtuse, and the arms of the forks very patent. The *filaments* of which the net is composed are excessively slender, not quite cobwebby, but finer than human hair; the meshes are of unequal size, pentangular or hexangular, and emit from the angles short, horizontally patent ramuli. These latter usually consist of a single cell. The *articulations* are all cylindrical, not contracted at the joints, and are filled with rose-coloured endochrome. The *fruit* has not yet been seen. The *substance* is delicately membranous, and the frond closely adheres to paper in drying.

* * *

In the present Plate I figure two species of *Halodictyon*, of both of which I obtained very few specimens. and these manifestly in a not fully developed state. In a future number I shall have an opportunity of showing, under *H. australe*, that Sonder's genus "*Hanowia*" is the same as the earlier *Halodictyon*, founded by Zanardini on an Alga of the Adriatic. It is interesting to find, at such opposite geographical points, closely allied Algæ of such remarkable organization.

A. Fig. 1. HALODICTYON ARACHNOIDEUM,—*the natural size.* 2. A portion of the network, *magnified.* 3. One of the meshes, more highly *magnified.*

PLATE XXXVII. B.

HALODICTYON ROBUSTUM, *Harv.*

HALODICTYON *robustum;* network (scarcely mature) compressed; filaments setaceous, the primary articulations ovoid, much contracted at the joints, 2–3 times longer than broad; stichidia ovate-oblong, with beaded margins; tetraspores biseriate.

H. robustum; *reticulo (vix evoluto) compresso; filis setaceis, articulis ovoideis ad genicula valde contractis diametro 2–3-plo longioribus; stichidiis ovato-oblongis marginatis; tetrasporis biseriatis.*

HANOWIA robusta, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 558; *Alg. Austr. Exsic. n.* 117.

HAB. Dredged off Fremantle, W. Australia, *W. H. H., G. Clifton.*

GEOGR. DISTR. As above.

DESCR. The few specimens yet seen are obviously immature, though one or two are in fruit. In the stage observed, the network forms an irregular sponge-like mass, bristling with small hair-like ramuli, and showing indications of erect branches, which probably (in full-grown specimens) become repeatedly forked. The *filaments* are as thick as horsehair, composed of oblong-oval cells, containing deep-red endochrome, surrounded by a wide hyaline limbus. The *articulations* vary in length, but are rarely more than thrice their diameter. The *stichidia* (discovered by *Mr. Clifton*) are often in pairs, and either issue from the angles of the network or from a free ramulus; they are bordered with a row of inflated, pellucid cells, that look like beads, and contain dark-red *tetraspores* in a double row.

This species obviously differs from the foregoing in the shape and dimensions of the component cells. The figures are drawn to the same scale.

B. Fig. 1. HALODICTYON ROBUSTUM,—*the natural size.* 2. One of the meshes. 3. A pair of *stichidia.* 4. A tetraspore:—the latter figures more or less *magnified.*

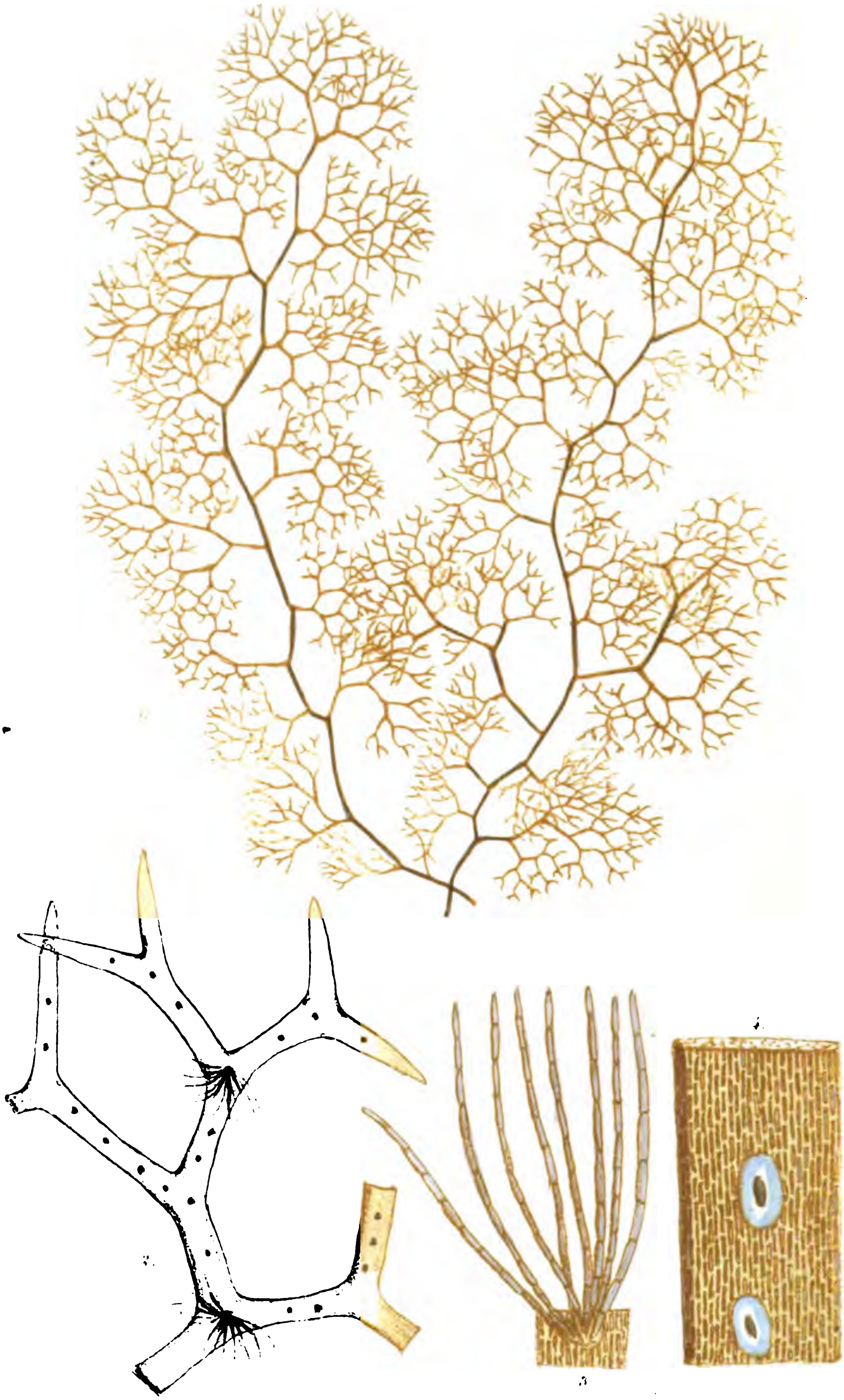

2
3
4

PLATE XXXVIII.

DICTYOTA FURCELLATA, *Ag.*

GEN. CHAR. *Root* woolly. *Frond* flat, linear, membranous, ribless, areolate, dichotomous or irregularly cleft. *Fructification: spores* superficial, either collected in spot-like sori, or scattered singly over both surfaces of the frond.—DICTYOTA (*Lamx.*), from δικτυον, *a net;* because the surface, under a lens, has a netted, or rather, a tessellated appearance.

Radix stuposa. Frons plana, linearis, membranacea, ecostata, areolata, dichotoma aut vage fissa. Fruct., sporæ superficiales in soros maculæformes aggregatæ v. singulatim per utramque paginam frondis dispersæ.

DICTYOTA *furcellata;* frond extremely narrow, distantly forked or subsimple, zigzag, alternately compounded; the lateral divisions many times dichotomous, with very wide axils, spreading segments, and divaricating, acute points; spores solitary, distant.

D. furcellata; *fronde angustissima subsimplici angulatim flexa alterne decomposita; segmentis lateralibus pluries dichotomis, axillis laciniisque patentissimis, apicibus divaricatis acutis; sporis solitariis distantibus.*

DICTYOTA dichotoma, *Ag. Syst. Alg. p.* 266. *J. Ag. Sp. Alg. v.* 1. *p.* 90. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 536; *Alg. Exsic. Austr. n.* 67.

DICTYOTA angusta, *Harv. in Herb. Curdie, etc. (olim).*

HAB. Covering the bottom, in 4–5 fathoms. Extremely common in Princess Royal Harbour, K. G. Sound, *W. H. H.* Fremantle, *G. Clifton.* Port Phillip, *Mrs. Mallard.* South Australia, *Dr. Curdie.*

GEOGR. DISTR. West and south coasts of Australia.

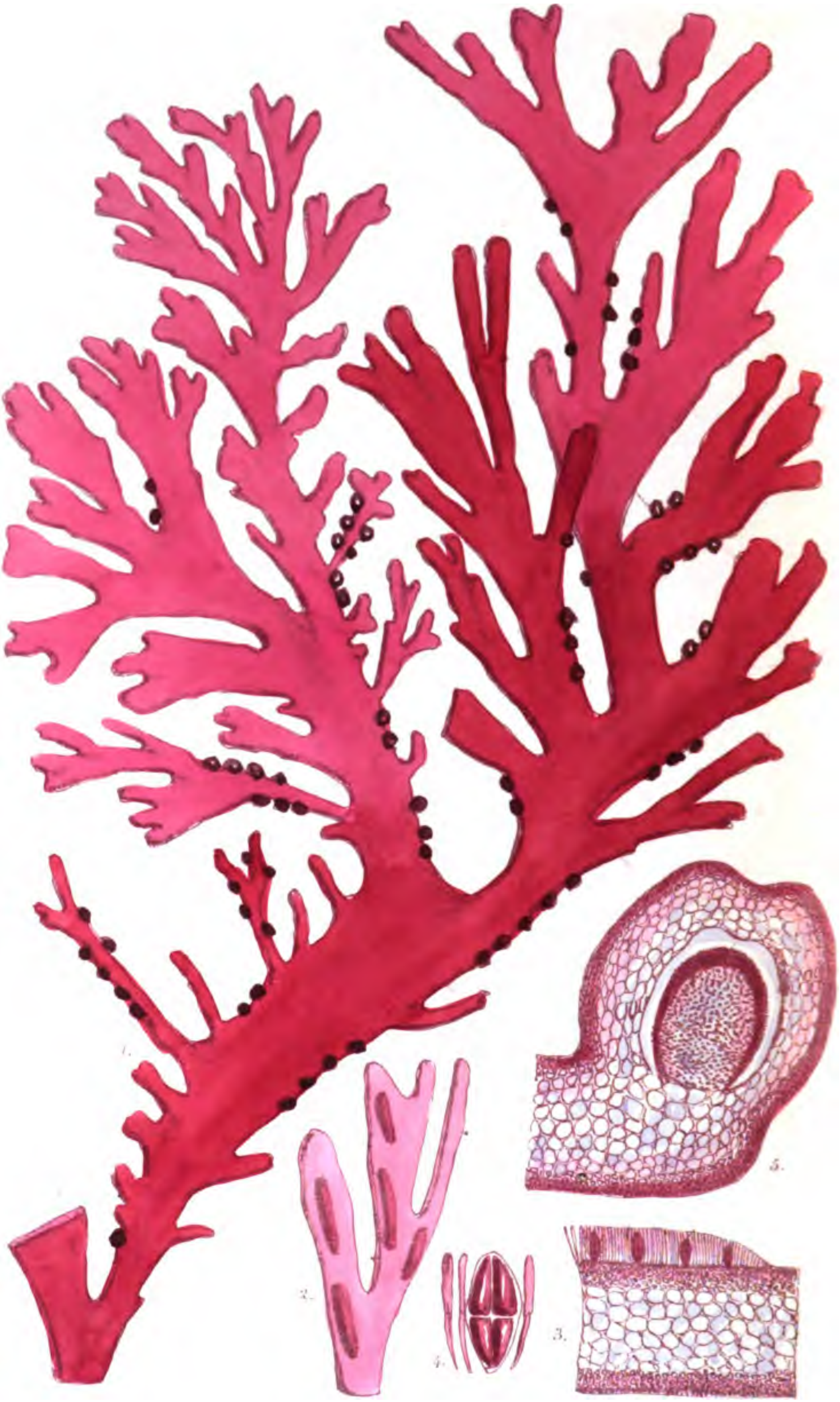
DESCR. Forming large, globular or rolled tufts, the numerous slender fronds frequently inextricably interwoven. *Fronds* 8–10 inches long or more, scarcely half a line and often much less in breadth, with a zigzag, subsimple or remotely dichotomous leading stem, which is set throughout with lateral branches. The *branches* are one or two inches long, fastigiate, many times dichotomous, all the axils extremely patent, and the apices divaricate. The surface of the membrane is marked with oblong, linear cells. The *spores* (?) are distinct, vesicated with wide perispores, and form a subsimple line down the centre of the segments. Under some of the axils, especially toward the apex of the frond, there is often a tuft of jointed hairs. The *colour* is a pale yellowish-olive. The *substance* is membranous and rather soft, and the frond adheres to paper in drying.

* * *

I am not sure whether this plant be the same as that described by Agardh; or whether it may not also be *D. minor* of Sonder in Pl. Preiss. It is exceedingly abundant on the shores of Western Australia, particularly in K. G. Sound, where the bottom of the harbour is in summer carpeted with it over large spaces. The fronds vary a little in breadth, and the broader ones show a tendency toward assuming the characters of *D. paniculata*, and it is just possible that this may be an extreme form of that plant. I have however very similar specimens from widely separated localities. The tufts of hairs often formed under the axils, are anomalous; and the spores (?) here figured are perhaps antheridia.

Fig. 1. DICTYOTA FURCELLATA,—*the natural size.* 2. Portion of a branch. 3. One of the tufts of jointed hairs. 4. Portion of the membrane, with two spores (?):—the latter figures variously *magnified.*

Plate XXXIX.



Vincent Brooks Imp.

PLATE XXXIX.

CURDIEA LACINIATA, *Harv.*

GEN. CHAR. *Frond* flat, coriaceo-cartilaginous, laciniate, composed of two strata of cells; the inner stratum consisting of roundish angular cells, the outer of very minute, aggregated, subvertically seriated, coloured cellules. *Fructification:* 1, marginal, globose, sessile *coccidia*, containing, within a very thick pericarp, minute spores arranged in spore-threads issuing from a large, fleshy central placenta; 2, cruciate *tetraspores* formed in superficial, intramarginal warts (*nemathecia*). —CURDIEA (*Harv.*), in honour of Dr. Curdie, of Tandarook, Geelong, an early observer of Australian Algæ.

Frons plana, coriaceo-cartilaginea, laciniata, duplici strato constituta; cellulis interioribus rotundato-angulatis majoribus extus sensim minoribus, exterioribus v. periphericis minimis coloratis verticaliter subseriatis. Fruct.: 1, *coccidia marginalia, globosa, sessilia, sporas minutas in filis ex placenta carnosa centrali radiantibus evolutas intra pericarpium crassum foventia;* 2, *tetrasporæ cruciatim divisæ, in nematheciis intramarginalibus oblongis superficialibus evolutæ. —Alga rubro-sanguinea, siccitate rigida.*

CURDIEA *laciniata*, Harv.

CURDIEA laciniata, *Harv. in An. Nat. Hist. ser.* 2. *v.* 15. *p.* 333; *Alg. Austr. Exsic. n.* 303.

HAB. Cast up from deep water. Port Fairy, *Mrs. Eddington* (communicated by *Dr. Curdie*), *W. H. H.* Guichen Bay, *Dr. F. Mueller.* Port Phillip Heads, *Dr. F. Mueller, W. H. H.*

GEOGR. DISTR. South coast of Australia.

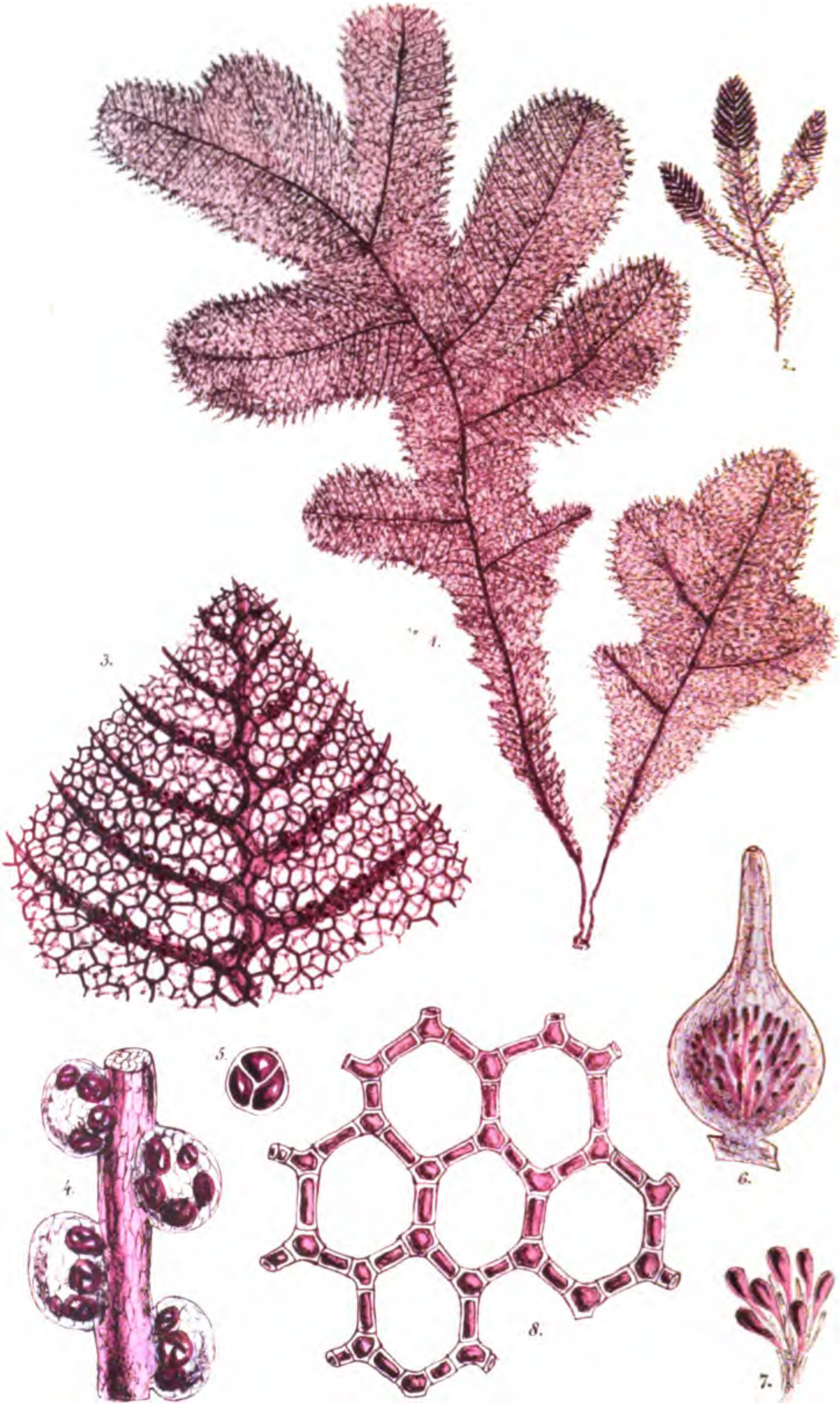
DESCR. *Root* a small disc. *Frond* 1–2 feet long, and as much in the expansion of the laciniæ, flat, cut into very many ribbon-like, very irregularly-divided laciniæ, which vary in breadth from half an inch to an inch or more. Sometimes the frond is palmatifid, and then the principal segments are cuneate at base, the lesser ones linear; sometimes the division is more on a pinnate type, and then the principal segments are linear, margined with simple, or cloven, or palmatifid lateral lobes. The axils are all narrow, and contiguous segments are generally subparallel. The apices are nominally blunt, but frequently attenuated, and variously jagged. The *coccidia* are as large as cabbage-seed, sessile along the margin, and frequently studded in regular series, resembling glandular crenatures: their walls are very thick; the cavity large, but nearly filled up with a cellular placenta rising from the base; the surface of the placenta is clothed with radiating, densely aggregated spore-threads, which dissolve into minute spores, that are at length ejected through a terminal orifice. The *tetraspores* are *cruciate,* and vertically placed among the filaments of superficial warts (*nemathecia*) of an oblong or linear form. The *colour* is a rich, deep blood-red, becoming darker in drying. The *substance* is thick, leathery when recent, rigid and somewhat horny when dry, and the frond scarcely adheres to paper in drying.

* * *

The first specimens I saw of this fine Alga were sent me by Dr. Curdie, of Geelong, together with a considerable collection of Algæ made by him near the mouth of the Glenelg, in South Australia; and in inscribing the genus with his name I but pay a tribute of respect to an early explorer of the Australian shore. I had selected, and distributed to some correspondents, another *Curdiea*, from the same collection, but was obliged to cancel the name, having afterwards ascertained it to be *Acrotylus*, J. Ag. The genus now established will rank near *Gracilaria*, from which it differs specially in the tetrasporic fruit, and near *Sarcodia*, from which it differs in structure. It appears to extend along the whole coast of Victoria, and is not very rare, though among the rarer Algæ. Its large dark-red marginal *coccidia* are very characteristic, but scarcely two specimens are to be found with similar branching. The figure given represents portion of a much larger frond.

Fig. 1. CURDIEA LACINIATA; portion of a frond, with marginal *coccidia*. 2. A fragment, with *nemathecia*:—both of the *natural size*. 3. Section of the frond and of a nemathecium. 4. A *tetraspore* and *paranemata*. 5. Section of a *coccidium*:—all *magnified*.

Plate XL.



Vincent Brooks Imp.

PLATE XL.

THURETIA QUERCIFOLIA, *Dne.*

GEN. CHAR. *Frond* stipitate; stipes filiform, inarticulate, branched; the branches bearing pinnatifid, compressed or flattened, midribbed and penninerved *networks*, formed of confervoid, anastomosing ramelli. *Fructification*: 1, urceolate *ceramidia* springing from the midribs of the network, and containing a tuft of pear-shaped spores; 2, subglobose *stichidia*, sessile on the lateral nerves of the network, containing tripartite tetraspores.—THURETIA (*Dne.*); worthily dedicated to M. Gustave Thuret, one of the ablest and most successful investigators of the physiology of the Algæ.

Frons stipitata; stipes filiformis, inarticulatus, ramosus; ramis in reticula compressa v. applanata costata et penninervia, ex filis confervoideis anastomosantibus formata exeuntibus. Fruct.: 1, *ceramidia urceolata, ex costis reticuli enata, fasciculum sporarum pyriformium continentia;* 2, *tetrasporæ triangule divisæ, in stichidiis subglobosis ad nervos sessilibus evolutæ.*

THURETIA *quercifolia*; network flattened, linear-oblong, lobed or subpinnatifid; the lobes broadly oblong, obtuse, fimbriato-dentate; articulations about twice as long as broad; ceramidia much acuminated.

T. quercifolia; *reticulo applanato lineari-oblongo lobato aut pinnatifido; segmentis oblongis obtusis fimbriato-dentatis; articulis brevibus; ceramidiis ore porrecto.*

THURETIA quercifolia, *Dne. in An. Sc. Nat. s.* 3. *v.* 2. *p.* 236. *Kütz. Sp. Alg. p.* 673. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 537; *Alg. Exsic. Austr. n.* 118.

HAB. Western and southern shores of Australia. Particularly abundant at Port Phillip Heads, and at Western Port, *Mrs. Mallard, W. H. H.*, etc.

GEOGR. DISTR. As above.

DESCR. *Root* discoid. *Stems* many from the same base, filiform, cartilaginous, elongate, often spirally coiled round each other, or so interwoven as to be inextricable, naked below and laterally branched; the branches passing into the bases of the networks, through which they are continued to the summit as midribs. The *frond* consists of a double system of growth; an axis or skeleton which forms the framework, and a superficial network. The axis is externally inarticulate, but formed (on the plan of a *Polysiphonia* or *Dasya*) of numerous longitudinal cells surrounding a central cell. It emits distichously, at intervals of about the tenth of an inch, lateral polysiphonous ramuli, which spread subhorizontally, and constitute the nerves of the penninerved frond. Over this closely pinnated framework is spread the net, which is composed of anastomosing confervoid ramelli that issue from the sides of the midrib and nerves. These only differ from those of a *Dasya* by the anastomosis of their lower divisions; the extremities are free, and stand out from the surface like hairs. The general form of the frond resembles that of an oak-leaf, between lyrate and pinnatifid; the margin is fringed with teeth-like, multifid fimbrils, which disappear in old specimens. In the winter season the stems become partially or wholly denuded, and are then found bearing fruit of both kinds. The *ceramidia* always spring from the midribs and generally near the summits, one on each lobe; they are shaped something like an amphora, with a long, projecting neck. The *stichidia* are formed only on the lateral nerves, likewise toward the apices of the lobes; and what may be called the tetrasporic inflorescence, constitutes an ovate, distichously pinnated, compound spike; each individual stichidium being very minute, roundish, and producing three or four tetraspores. The *substance* of the frond, though flaccid and tender, is not gelatinous, and does not soon decay in fresh-water. The *colour* is rosy, but not brilliant, and is sometimes brownish-red, or tinted with rosy-purple toward the extremities. In drying the plant adheres closely to paper.

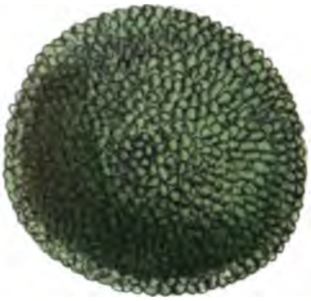
* * *

There are some Algæ of such elaborate structure, that my rude pencil cannot do them even moderate justice; and this is one of them. And there are some men so deserving of the honours of science, that no compliments paid to them can add lustre to their name; and M. Thuret, after whom the present Alga has been named, is such a one. I need not remind algologists that it is to his admirable researches, carried on for several years, that we owe a knowledge of some of the most remarkable facts attending the development of Algæ and fertilization of their spores.

A second species of *Thuretia* will be figured in a future number.

Fig. 1. Thuretia quercifolia, a summer frond. 2. A fragment of the winter frond, bearing *tetraspores*:—both of the *natural size*. 3. Apex of an old network, with *stichidia* on the lateral nerves. 4. A small portion of a nerve, with its stichidia, denuded. 5. A tetraspore. 6. A ceramidium. 7. Spores from the same. 8. Fragment of the net:—all the latter figures more or less *magnified*.

Plate XLI.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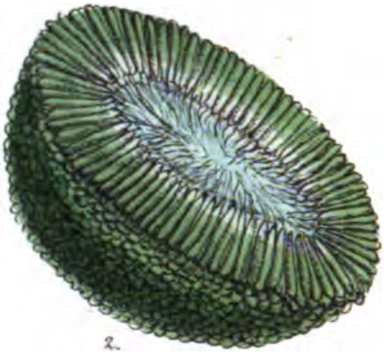
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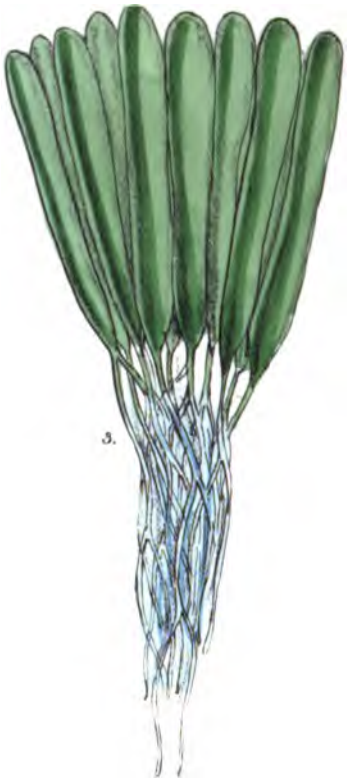
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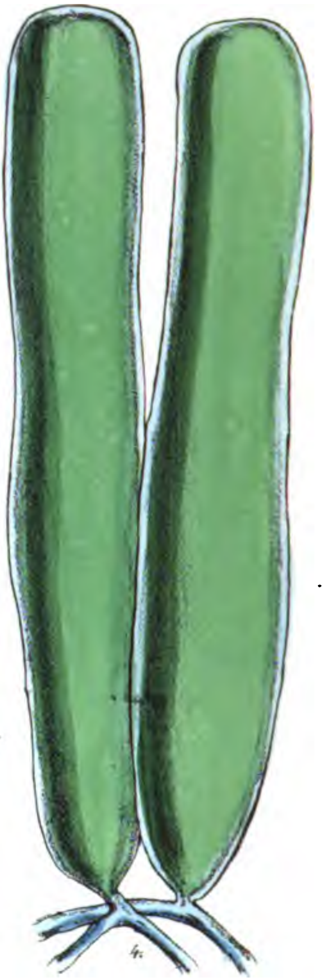
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Vincent Brooks Imp.

PLATE XLI.

CODIUM MAMILLOSUM, *Harv.*

GEN. CHAR. ***Frond*** sponge-like, composed of a plexus of unicellular, branching filaments, filled with green, semifluid endochrome. ***Fructification:*** lateral ***sporangia*** borne on the peripheric ramuli, and containing innumerable ***zoospores***.—CODIUM (*Stackh.*), from *κωδιον, the skin of an animal.*

Frons spongiæmorpha, e plexu filorum unicellulorum ramosorum conflata; endochromate lætevirente, grumoso. Fruct., sporangia propria, lateralia, ex ramulis periphericis enata, zoosporas indefinitas foventia.

CODIUM ***mamillosum;*** frond nearly spherical, solid, fixed by a point only; interior filaments densely interwoven; the peripheric ramuli very thick, inflato-cylindrical, their apices forming superficial prominences like mamillæ; when dry, glistening.

C. mamillosum; *fronde globosa solida puncto affixa; filis interioribus densissime intertextis arachnoideis gelatina subsolida obvallatis; periphericis maximis inflato-cylindraceis, eorum apicibus mamillæformibus ad superficiem frondis directis, siccitate sericeo-nitentibus.*

CODIUM mamillosum, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 565; *Alg. Austr. Exsic. n.* 578.

HAB. Cast ashore from deep water. Fremantle, and King George's Sound, *W. H. H., G. Clifton.*

GEOGR. DISTR. Western Australia.

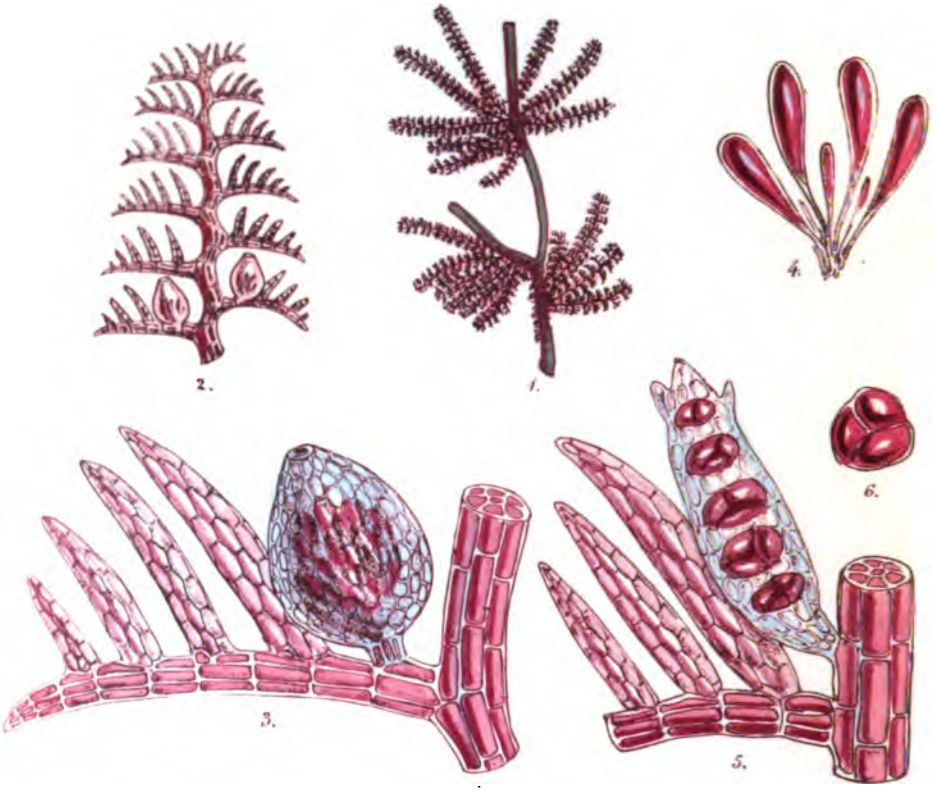
DESCR. ***Root*** a mere point of fixture. ***Frond*** spherical, egg-shaped or kidney-shaped, very dense and solid. When cut across, the central portion is seen to be formed of innumerable, very slender, branching, interwoven, thread-like filaments, set in and surrounded by a rather firm but slimy jelly; and the exterior portion, or peripheric stratum, of very thick, inflated, bright-green, bag-like ramuli, which rise from the slender internal filaments, and are continuous with them at the base. The centre of the frond therefore may be regarded as composed of interwoven rootlets, of which the peripheric ramuli are the true fronds, the sphere being a compound body formed of a colony of unicellular Algæ. The membrane is very tough and fine, and when dry has a vitreous or satiny lustre. The endochrome is bright-green, thickish, and fills the ramuli. No ***fruit*** has been observed. When dry the frond does not adhere to paper.

This curious plant is in all essential characters a *Codium*, but the peripheric ramuli are of such large size, so much distended, and so glassy, that at first sight it might be taken for a *Valonia*. The texture is very gelatinous, the filaments inextricably interwoven, and the balls contain so much slime that they are a long time in drying. I once or twice found the frond attached, but usually there is no mark on the surface by which one point more than another can be recognized as base or apex. Probably after a time it becomes detached and floats freely in the sea as *Cladophora Ægagropila* does in fresh-water lakes. The fruit remains a desideratum.

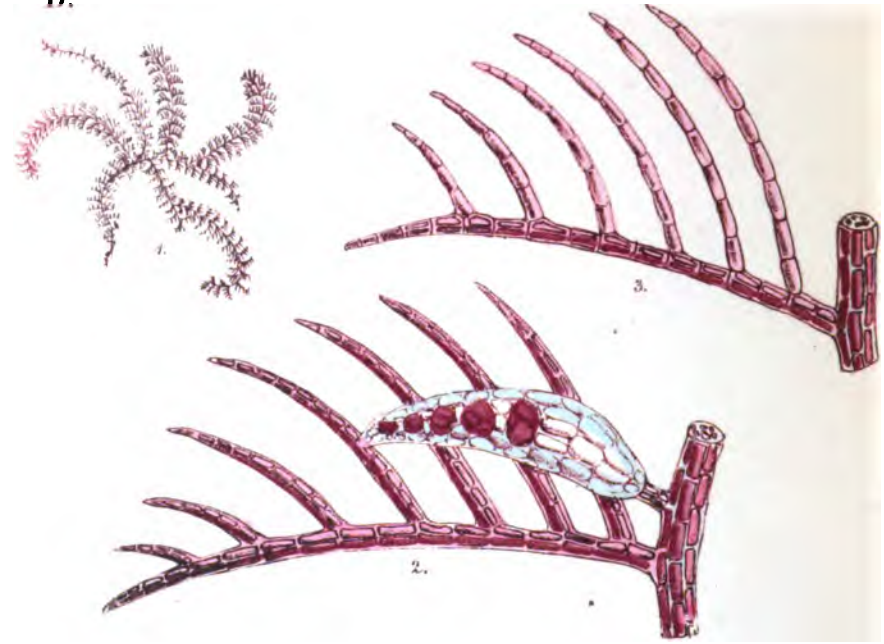
Fig. 1. CODIUM MAMILLOSUM. 2. The same cut across:—both figures of the natural size. 3. Portion of the periphery and central filaments,—*magnified*. 4. Two peripheric branches,—*more highly magnified*.

Plate XLII.

A



B.



Vincent Brooks Imp.

PLATE XLII. A.

POLYZONIA INCISA, *J. Ag.*

GEN. CHAR. *Stem* filiform, articulated, polysiphonous. *Ramuli* distichous, alternate, plano-compressed, leaf-like, entire on the lower edge, toothed or pectinato-partite on the upper, transversely zoned with hexagonal cells. *Fructification:* 1, ovate *ceramidia*, containing a tuft of pear-shaped spores; 2, lanceolate *stichidia*, simple or crested, supra-axillary, pedicellate, containing large tetraspores in a single row.—POLYZONIA (*Suhr*), from πολυς, *many*, and ζωνη, *a band.*

Caulis filiformis, articulatus, polysiphonius; ramuli distichi, alterni, plano-compressi, foliiformes, deorsum integerrimi, sursum varie dentati v. pectinato-partiti, transversim zonati, cellulis hexagonis. Fruct.: 1, *ceramidia ovata, fasciculum sporarum pyriformium continentia;* 2, *stichidia lanceolata sæpe cristata, supra-axillaria, tetrasporas magnas singula serie evolutas foventia.*

POLYZONIA *incisa;* primary surculus creeping; stems erect, simple or pinnate; ramuli (or leaves) pectinato-partite on the upper edge, laciniæ 4–5, lanceolato-linear, acute, areolate, the cells in three rows; ceramidia ovate, nearly axillary; stichidia crested, supra-axillary, erecto-patent.

P. incisa; *surculo repente; caulibus erectis simplicibus v. pinnatis; ramulis (v. foliis) sursum pectinato-partitis, laciniis* 4–5 *lanceolato-linearibus acutis areolatis, cellulis oblongis triseriatis; ceramidiis ovatis ex lacinula prima foliorum formatis; stichidiis cristatis supra-axillaribus adscendentibus.*

POLYZONIA incisa, *J. Ag. in Linn. v.* 15. *p.* 24. *Harv. Ner. Austr. p.* 71; *Alg. Exsic. Austr. n.* 144.

HAB. Parasitical on Fucoids, and on *Gelidium glandulæfolium*, etc. Port Fairy, plentiful, *W. H. H.* S. Australia, *Dr. Curdie, Dr. Mueller.* Tasmania, *R. Gunn, Dr. Lyall.*

GEOGR. DISTR. South coast of Australia, and Tasmania.

DESCR. *Primary frond* prostrate, rooting at the nodes, creeping over other Algæ. From this there rise several erect *stems*, ½ inch to 1 inch long, simple or alternately pinnate, articulate; the *articulations* scarcely so long as broad, composed of six cells surrounding a central cavity. *Ramuli* alternate, horizontally patent or somewhat recurved, pectinate on the upper side; the *laciniæ* 4–5, somewhat lanceolate, tessellated with three rows of hexagonal, oblong cells. *Capsules* broadly ovate, subsessile, formed from the lowest segment of the fertile ramulus, and thus nearly in the axil; the *pericarp* areolated, thin, and containing a dense tuft of pyriform spores. *Stichidia* lanceolate, suberect, supra-axillary, more or less crested at the summit, containing a single row of large tripartite tetraspores. *Colour* a deep full red, becoming brighter in fresh-water. *Substance* somewhat cartilaginous but soft. In drying the plant adheres to paper.

A pretty species, intermediate in character between *Polyzonia*, of which it has the stichidia and *definite* ramuli; and *Polysiphonia*, which it resembles in habit. Some *Polysiphoniæ*, such as *P. versicolor* and its allies, have similarly *definite* ramuli, but their tetraspores are not contained in proper pods, but in the ordinary branches: and this is the only essential distinction between these genera.

A. Fig. 1. POLYZONIA INCISA,—*the natural size.* 2. Tip of a fertile branch, with distichous, pectinate ramuli, two of which have *ceramidia.* 3. A ramulus and *ceramidium.* 4. Spores. 5. Part of a ramulus and *stichidium.* 6. A tetraspore:—the five latter figures more or less *magnified.*

PLATE XLII. B.

POLYZONIA FLACCIDA, *Harv.*

POLYZONIA *flaccida;* primary surculus creeping; stems erect, arching, simple or branched, very slender, flaccid; ramuli pectinato-partite on the upper edge, laciniæ 5–6, filiform, acute, articulate, mono-di-siphonous; stichidia arched, rostrate.

P. flaccida; *surculo repente; caulibus erectis arcuatis simplicibus v. vage ramosis tenuissimis flaccidis; ramulis sursum pectinato-partitis, laciniis* 5–6 *filiformibus acutis articulatis mono-di-siphoniis; stichidiis arcuatis rostratis.*

POLYZONIA flaccida, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 539; *Alg. Exsic. Austr. n.* 146.

HAB. Parasitical on small Algæ. Fremantle and K. G. Sound, *W. H. H.*

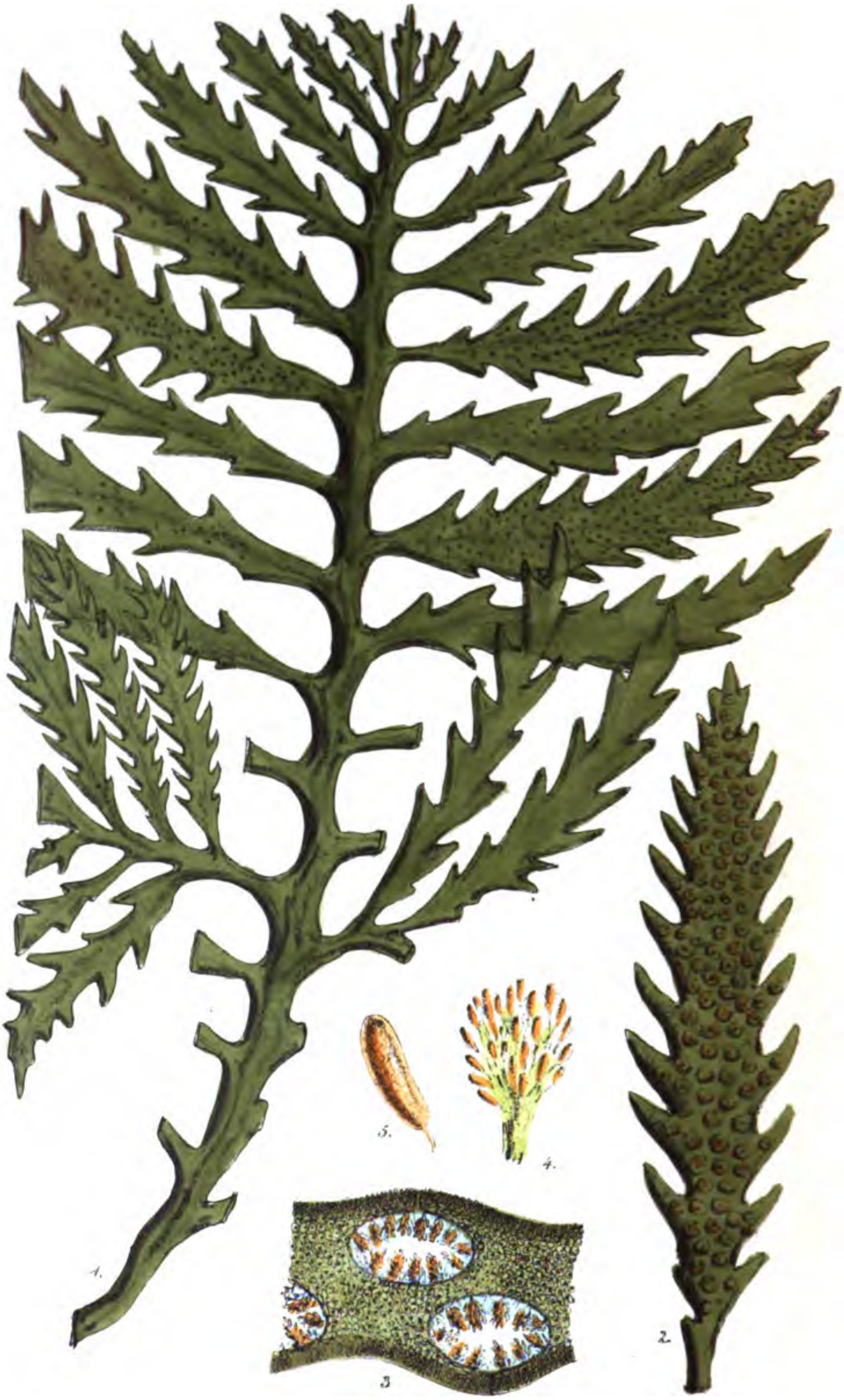
GEOGR. DISTR. W. Australia.

DESCR. Very closely allied to *P. incisa*, but much more slender, of softer and more flaccid substance, with longer, more numerous, and more attenuated segments to the ramuli. In the specimens first seen, these ramuli are monosiphonous; but this character is not constant. The *stichidia* are very patent, and their apex is prolonged into a sort of beak. The *colour* is a full crimson-red.

This may perhaps be merely a very slender, deep-water variety of the foregoing, or of *P. Sonderi.* When I first described it I thought the ultimate segments were *always* monosiphonous, but now find this to be a variable character.

B. Fig. 1. POLYZONIA FLACCIDA,—*the natural size.* 2. A ramulus with its superposed *stichidium.* 3. A ramulus with monosiphonous laciniulæ:—both *magnified.*

Plate XLIII.



Vincent Brooks Imp.

PLATE XLIII.

CARPOGLOSSUM QUERCIFOLIUM, *J. Ag.*

GEN. CHAR. *Root* discoid. *Frond* with subdistinct stem and leaves, pinnate; leaves vertically flattened, imperfectly costate. *Vesicles* and *receptacles* none. *Spore-cavities* scattered over both surfaces of the leaves, hemispherically prominent, monœcious. *Paranemata* simple.—CARPOGLOSSUM (*Kütz.*), from *καρπος, fruit,* and *γλωσσα, a tongue;* because the fruit-bearing leaves are tongue-shaped.

Radix scutata. Frons caule a foliis subdistincto heterogenea, pinnatim decomposita; phyllodiis verticaliter applanatis, immerse costatis. Receptacula propria et vesiculæ nullæ. Scaphidia in utraque pagina foliorum sparsa, hemisphærice prominentia, monoica. Sporæ obovoideæ, subsessiles. Paranemata simpliciuscula.

CARPOGLOSSUM *quercifolium;* frond closely pinnated; stem two-edged, narrower than the horizontal, lanceolate, pinnatifid phyllodia (or leaves); spore-cavities in many rows.

C. quercifolium; *fronde crebre pinnata; caule ancipite phyllodiis lanceolatis pinnatifidis horizontalibus augustiore; scaphidiis pluriseriatis.*

CARPOGLOSSUM quercifolium, *J. Ag. Sp. Alg. v.* 1. *p.* 193. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 534; *Alg. Austr. Exsic. n.* 38.

MYRIODESMA quercifolium, *Kütz. Sp. Alg. p.* 588 (*non J. Ag.*).

PLATYTHALIA quercifolia, *Sond. Pl. Preiss. v.* 2. *p.* 158.

CYSTOSEIRA quercifolia, *Ag. Sp. Alg. p.* 70.

FUCUS quercifolius, *Turn. Hist. Fuc. t.* 151.

HAB. In deep rock-pools, on coast reefs. Rottnest Island, *W. H. H.* Cast ashore at Fremantle, etc., *Preiss.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* a flattened disc. *Fronds* tufted, 1–2 feet long, subsimple. *Stem* cylindrical at base, soon flattening, and continued upwards as a flattened, two-edged main-rachis, two lines wide, thickened and somewhat midribbed in the middle, nearly straight; closely pinnated throughout its length with horizontal, leaf-like branches or phyllodia. Of these one or two or more of the lowest are, in full-grown specimens, lengthened out and again pinnated like the main rachis. The majority of the pinnæ however are simple, lanceolate, tapering to each end, and more or less deeply inciso-pinnatifid. The *pinnules* are subulate or deltoid-acuminate. *Fruit* is borne abundantly in phyllodia but little altered or not at all different from the sterile ones. It is of similar structure to that of the *Fucoideæ* generally; and the spore-cavities contain either spores and antheridia or simply tufted antheridia.

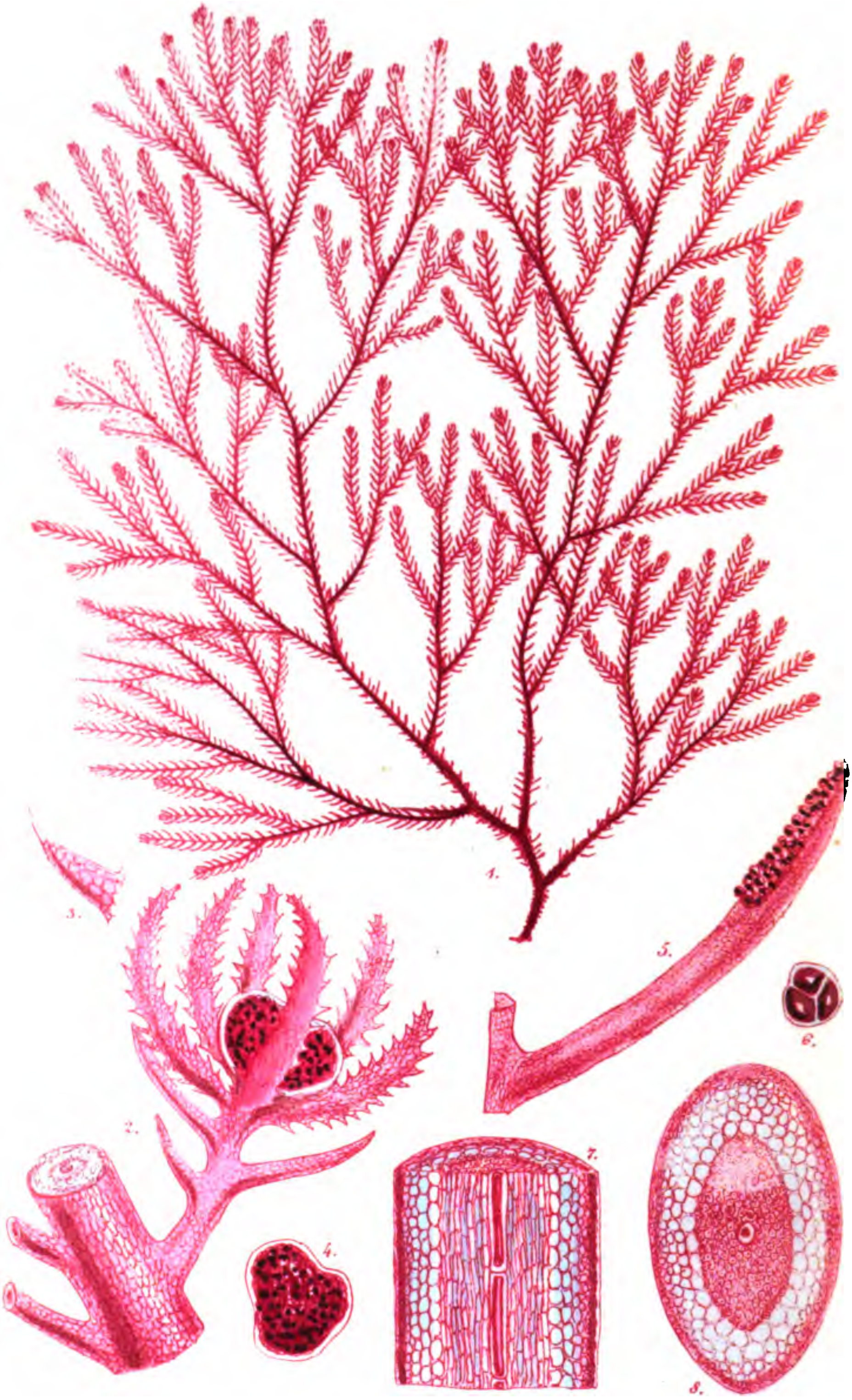
The *colour* of the frond is a clear glossy olive-brown, in drying changing to black. The *substance* is thick and coriaceous, very rigid when dry.

One of the more local of the Australian Fucoids, not having been found, except on the western coast, in the neighbourhood of Swan River.

The genus *Carpoglossum*, as understood by J. Agardh, includes three species, all Australian. It is nearly allied to *Myriodesma*, from which it differs in its pinnate, not dichotomous, ramification, and in having the fructification more concentrated in the lateral phyllodia. Through *C. confluens* it makes a near approach to *Fucodium*, from which its midribbed frond divides it. But indeed many of the so-called "genera" into which the *Fucaceæ* have been subdivided, scarcely differ from each other by more than artificial characters; and, in a revision of the family, I should feel disposed to restore the old genus *Fucus* of the elder Agardh to nearly the limits assigned by him. The three groups of species just mentioned might well fall into it.

Fig. 1. Carpoglossum quercifolium,—*the natural size.* 2. A fertile phyllodium. 3. Section through the same. 4. A tuft of antheridia. 5. An antheridium:—all more or less *magnified.*

Plate XLIV.



Vincent Brooks Imp.

PLATE XLIV.

PTILOTA RHODOCALLIS, *Harv.*

GEN. CHAR. *Frond* compressed or two-edged, distichous, pectinato-pinnate, inarticulate, cellular, with an articulate, monosiphonous axis; the pinnules sometimes articulate. *Fructification:* 1, involucrate *favellæ* terminating short branches and containing numerous angular spores; 2, *tetraspores*, attached to the pinnules, sessile or stalked, solitary or glomerulate, tripartite.—PTILOTA (*Ag.*), from πτιλωτος, *pinnated.*

Frons compressa v. anceps, disticha, pectinato-pinnata, corticata, axi articulato monosiphonio percursa; pinnulis sæpius corticatis, nunc pellucide articulatis. Fruct.: 1, *favellæ involucratæ in ramulo abbreviato terminales, sporas numerosas angulatas foventes;* 2, *tetrasporæ ad pinnulas sessiles v. pedicellatæ, sparsæ v. glomeratæ, triangule divisæ.*

PTILOTA *Rhodocallis*; frond slender, subcompressed, corticated, alternately twice or thrice compounded; branches and their divisions subdistant, rod-like, closely pectinato-pinnate; pinnules alternate, subulate, inarticulate; involucre of several serrated leaflets; tetraspores glomerated near the tips of the pinnules.

P. Rhodocallis; *fronde angusta subcompressa corticata alterne 2–3-decomposita; ramis majoribus minoribusque sparsis virgatis crebre pectinato-pinnatis; pinnulis alternis subulatis inarticulatis; foliolis involucri serratis; tetrasporis in glomerulum unilateralem ad marginem superiorem pinnularum creberrime aggregatis.*

PTILOTA Rhodocallis, *Harv. Alg. Austr. Exsic. n.* 478.

RHODOCALLIS elegans, *Kütz. Sp. Alg. n.* 670.

HAB. Cast ashore. Abundant at Port Fairy, Victoria, *Dr. Curdie*, *W. H. H.*, etc. (and all collectors of "seaweeds"). At South Port, Tasmania, *fide C. Stuart.*

GEOGR. DISTR. South coast of Australia. Tasmania?

DESCR. *Root* discoid. *Stem*, for an inch or two above the base, clothed with short, woolly hairs; afterwards glabrous, cylindrical or more or less compressed, undivided or once or twice forked, the divisions or main branches 4–6 inches long, continued throughout the frond. These principal branches emit lateral branches at intervals of about half an inch, and these are in turn once or twice similarly compounded. All the *axils* are acute, and the divisions erecto-patent. Every part of the *frond* is elegantly pectinated with short, alternate, subulate, acute ramuli, each about $\frac{1}{10}$ inch long. No articulations are superficially apparent in any part of the frond. The axial tube is slender, surrounded by a double, very thick cortical layer. The *favellæ* terminate abbreviated lateral branchlets, and are surrounded by several sharply serrated ramuli; the serratures spinous-tipped. The *tetraspores* are very small, and crowded in a dense sorus along the upper or inner edge of the pinnules, near their points. The *colour*, when quite recent, is a full dark-red; but on exposure to sun and air, and to fresh-water, it becomes an intensely brilliant carmine, which is then preserved in drying. The *substance* is cartilaginous, and the plant does not firmly adhere to paper in drying.

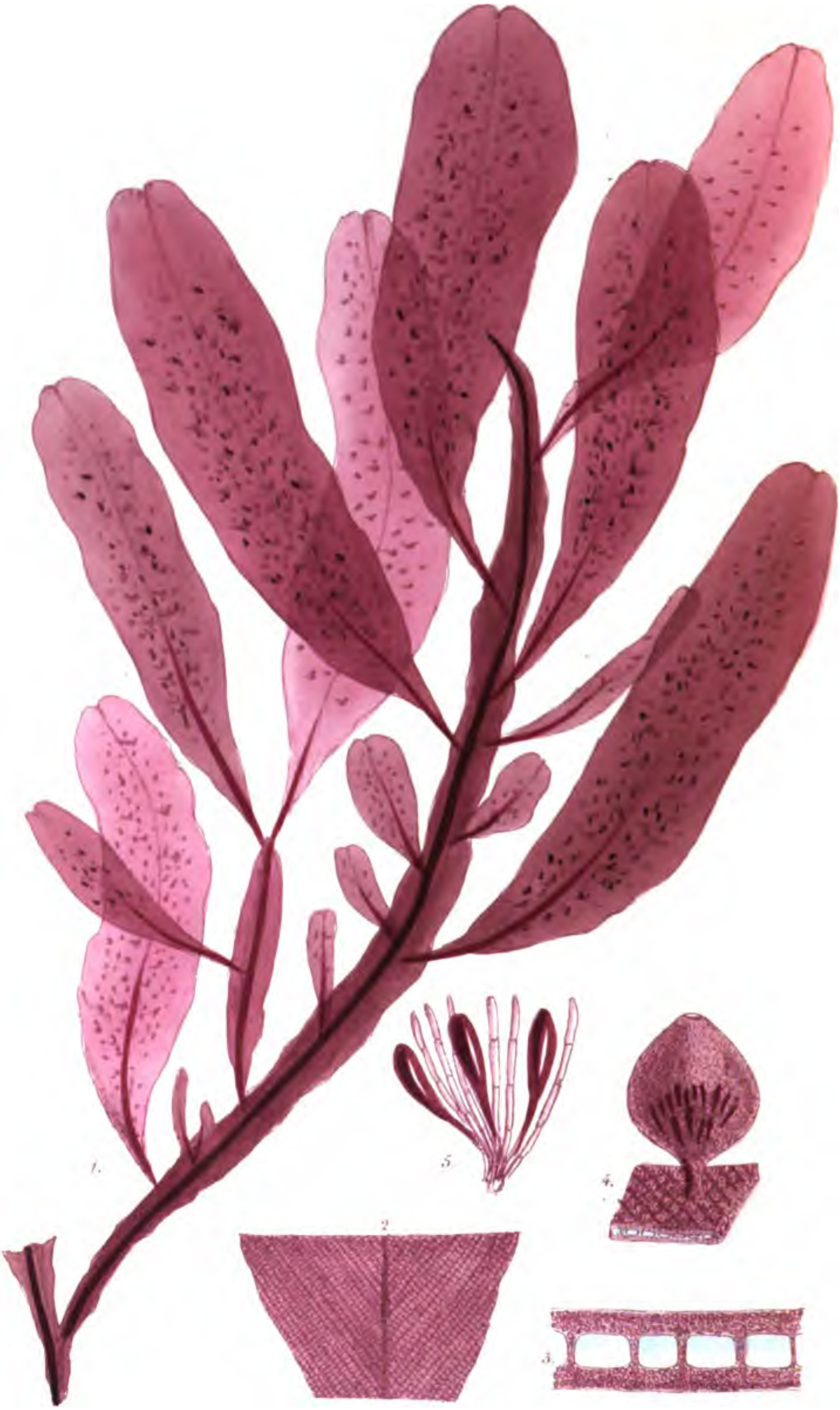
* * *

At first sight this beautiful species might almost be taken for *Phacelocarpus Billardieri*, so similar are its ramification and colour; but the structure of the frond, and the fructification, are so different, that we are forced to refer these Algæ to widely separated families. Geologists sometimes complain that botanists refuse definitively to name fossil plants whose impressions are left on sandstone, and, in the geological sense, " well preserved;" but cases such as the present—and it is one of a thousand—show how uncertain must be the " determination" even of the best stone-printing of a fossil stem. What shall we say then of the positive settlement of the affinities and structure of fossil shadows, where there does not remain the faintest trace in stone of the entity that " was and is not "?

Pt. Rhodocallis is as great a favourite with collectors in Australia as *Plocamium coccineum* is in Britain, and for the same reason. If the shore where it is lying be visited after a heavy shower of rain, its intense carmine is sure to attract the most careless eye; but this colour, like that of *Gelidium cartilagineum*, is due to the rain and sunshine, and after repeated washings and sunnings the glories fade away.

Fig. 1. PTILOTA RHODOCALLIS,—*the natural size*. 2. A branchlet, bearing an involucrate favella. 3. One of the teeth of the involucral leaflet. 4. A favella, removed. 5. A pinnule, bearing a cluster of tetraspores. 6. A tetraspore. 7. Longitudinal section of the frond. 8. Transverse ditto:—all more or less *magnified*.

Plate XLV.



Vincent Brooks Imp

Ser. RHODOSPERMEÆ. Fam. *Rhodomelaceæ.*

PLATE XLV.

LENORMANDIA MUELLERI, *Sond.*

GEN. CHAR. *Frond* leaf-like, proliferous. *Phyllodia* flat, membranaceous, undivided, midribbed, obliquely cross-striate, internally honeycombed with rhomboidal cavities; the surface-cells minute. *Fructification* of both kinds scattered over the surface: the 1st, ovate, pedicellate *ceramidia,* containing pear-shaped spores; the 2nd, lanceolate *stichidia,* containing tripartite tetraspores.—LENORMANDIA (*Sond.*), in honour of M. René Lenormand, of Vire, Calvados, a distinguished French algologist.

Frons foliacea, prolifera. Phyllodia plana, membranacea, indivisa, costata, decussatim striata; cellulis intimis magnis lacunosis oblique ordinatis, extimis minutis inordinatis. Fruct. utriusque generis sparsus: 1, *ceramidia pedicellata, sporas pyriformes foventia;* 2, *stichidia propria, lanceolata, tetrasporas triangule divisas continentia.*

LENORMANDIA *Muelleri;* caulescent; the stem cylindrical below, winged upwards, vaguely branched; branches linear, strongly costate, emitting oblong, emarginate, basally attenuate, stipitellate, echinulate, very entire phyllodia; ceramidia ovate, scattered over the disc.

L. Muelleri; *caulescens; caule bási tereti sursum alato vage ramoso; ramis linearibus valide costatis coriaceis phyllodia oblonga emarginata basi-attenuata stipitellata echinulata integerrima emittentibus; ceramidiis ovatis sparsis.*

LENORMANDIA Muelleri, *Sond. in Linn. v.* 25. *p.* 696. *Harv. Alg. Exsic. Austr. n.* 128.

LENORMANDIA Curdieana, *Harv. in Herb. T.C.D. (olim).*

HAB. Cast ashore from deep water. Rivoli Bay, *Dr. Mueller.* Mouth of the Glenelg, *Dr. Curdie* (1851). Port Fairy, *W. H. H.*

GEOGR. DISTR. South coast of Australia.

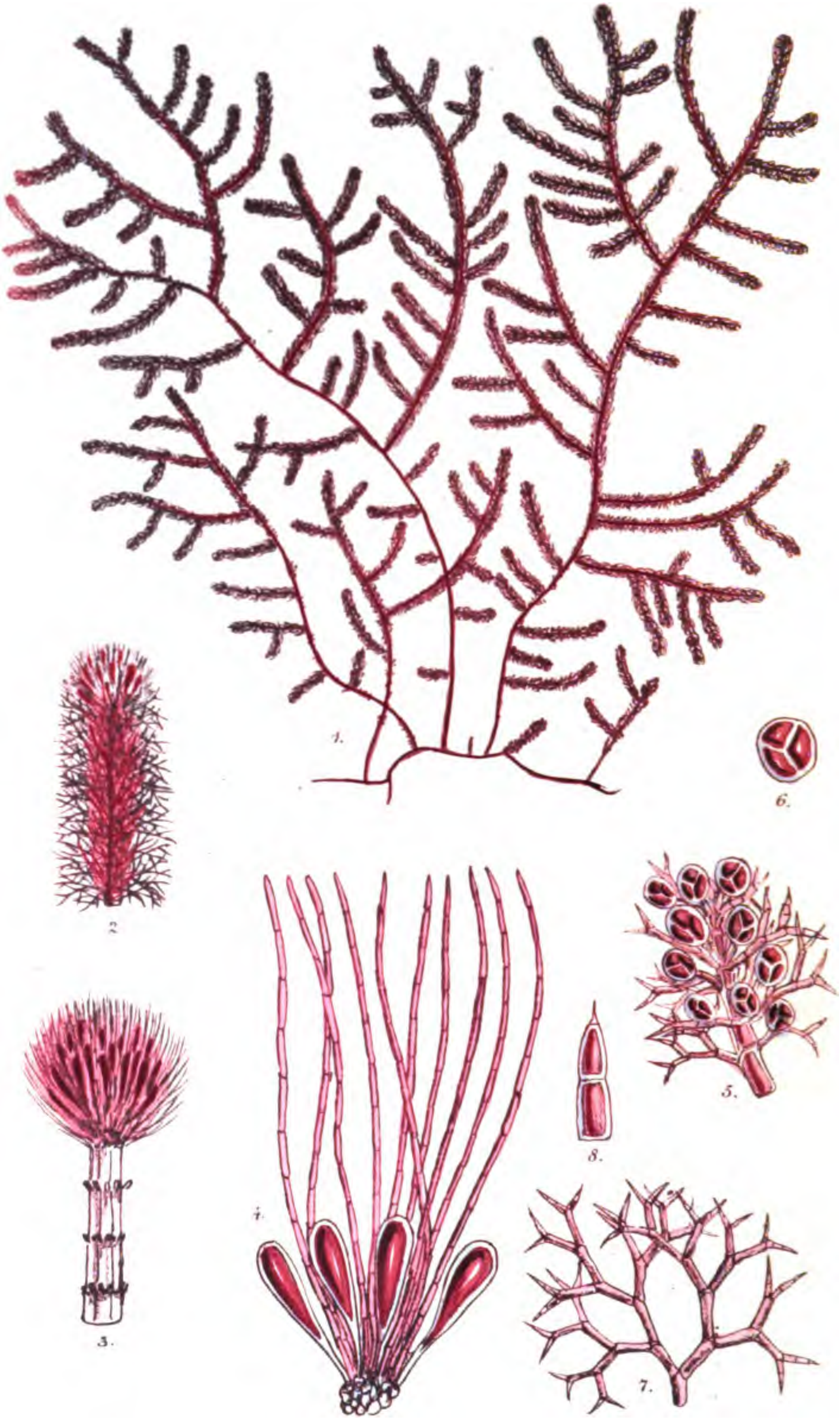
DESCR. *Root* discoid. *Fronds* tufted, 1–2 feet long, proliferously much branched. In full-grown specimens there is a cartilaginous, terete stem, as thick as whipcord, and one or more inches in length; this gradually becomes two-edged, and then winged upwards, dividing (proliferously) into 2–4 or more principal branches, which are bordered with a narrow wing and traversed by a thick midrib. These *main branches* are 6–8 or 10 inches long, and quite simple, being formed out of a partially denuded phyllodium of a former season: and they emit, from their midrib, numerous membranous phyllodia, varying much in size. The *phyllodia* are 2–4 inches long, about an inch wide, oblong, very obtuse or emarginate, tapering at base into a short stipes or petiole, delicately membranous, traversed by a very slender and often scarcely visible costa, and sprinkled with minute rough points. I have not seen *stichidia*; but *ceramidia* of an ovate form are often scattered over both surfaces of the frond, being developed out of the rough points: they contain a tuft of narrow-pear-shaped spores and paranemata. The surface of the frond, under a pocket-lens, appears decussated with oblique lines, which divide the membrane into lozenge-shaped areolæ, indicative of the large, obliquely seriated, rhomboid cells which constitute the central substance of the phyllodia. The *surface-cellules* are very minute, and in several rows. The *colour* is a brownish-purple, becoming much browner or even blackish in drying. The *substance* is firmly membranous; and the plant shrinks, and but imperfectly adheres to paper in drying.

* * *

It must be allowed that this handsome plant is very closely indeed related to the *L. spectabilis* of Western Australia, from which it chiefly differs in having a more decidedly caulescent frond, with more strongly ribbed phyllodia. The precise form and comparative length and breadth of the fronds are scarcely characters to be depended upon. I first received specimens in 1851, from *Dr. Curdie*, of Geelong, to whom I had proposed to dedicate the species, but in this, as in some other cases, I have been anticipated by my friend Dr. Sonder.

Fig. 1. LENORMANDIA MUELLERI,—*the natural size*. 2. Portion of a phyllodium (as seen with a pocket-lens). 3. Section through the same. 4. A ceramidium. 5. Spores and paranemata:—the latter figures all *magnified*.

Plate XLVII.



Vincent Brooks Imp.

PLATE XLVI.

WRANGELIA VELUTINA, *Harv.*

GEN. CHAR. *Frond* filiform, decompound, articulated, one-tubed; the *internodes* naked, or coated with minute cellules; the *nodes* clothed with opposite or whorled, articulated ramelli. *Fructification:* 1, *cystocarps* terminating short branches, involucrated by the uppermost whorled ramelli, and consisting of tufts of pear-shaped, pedicellate *spores* and slender *paranemata;* 2, naked, triangularly-parted *tetraspores,* borne on the sides of the whorled ramelli.—WRANGELIA (*Ag.*), in honour of Baron Wrangel, a Swedish naturalist.

Frons filiformis, decomposita, articulata, monosiphonia, nuda v. cellulis corticata, verticillis ramellorum ad genicula onusta. Fruct.: 1, *cystocarpia ramos terminantia, ramellis supremis involucrata, fasciculis numerosis sporarum pyriformium pedicellatarum et paranematibus tenuibus constantia;* 2, *tetrasporæ nudæ, triangule divisæ, ad ramellos sessiles.*

WRANGELIA *velutina;* frond cartilaginous, inarticulate, diffusely much branched; branches horizontally patent, once or twice compounded, the younger ones densely whorled with minute ramelli; ramelli dichotomo-multifid, with patent axils, mucronate, their articulations 3–4 times as long as broad; cystocarps terminating short lateral branchlets; tetraspores on the ramelli.

W. velutina; *cartilaginea, corticata, diffuse ramosissima; ramis horizontaliter patentibus v. recurvis plus minus compositis, junioribus densissime ramellis minutis verticillatis; ramellis dichotomo-multifidis patentibus rigidiusculis mucronatis, eorum axillis latissimis, articulisque diametro 3–4-plo longioribus; cystocarpiis ramos abbreviatos laterales terminantibus; tetrasporis ad ramellos sessilibus.*

WRANGELIA velutina, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 546; *Alg. Exsic. Austr. n.* 265.

DASYA velutina, *Sond. in Pl. Preiss. v.* 2. *p.* 179. *Harv. Ner. Austr. p.* 63. *t.* 23.

PHLEBOTHAMNION velutinum, *Kütz. Sp. Alg. p.* 659.

HAB. Cast ashore from deep water. Abundant at Rottnest Island and Fremantle; rarer at King George's Sound, Western Australia; also at Port Fairy, *W. H. H.*, and Port Philip, *Mrs. Mallard.*

GEOGR. DISTR. Western and southern coasts of Australia.

DESCR. *Root* discoid. *Fronds* tufted, 3–6 inches long, somewhat thicker than hog's-bristle, opaque and corticated throughout, much and very irregularly branched. Frequently there is a decumbent or prostrate stem, from which several secondary, erect stems irregularly spring. These are flexuous, filiform, undivided, and set with lateral, alternate or secund, very unequal, and horizontally-patent branches; some of these lateral branches are very short, or merely rudimentary; others are 1–2 or 3 inches long, and set with similarly patent and unequal laterals. All the branches are cylindrical and obtuse; the older ones naked; the younger closely whorled throughout with minute ramelli. These *ramelli* are so densely placed that they form a velvety coating to the branches, and are about ½ a line in length, and horizontally patent. They are many times dichotomous, with the forkings divaricating, and the ends of the divisions mucronate, or ending in a spine-like cellule. The *cystocarps* are formed at the ends of short branches, and are sunk in the midst of a dense, nest-like whorl of involucral filaments, and consist of tufts of large, pear-shaped, pedicellate spores, and of long, filiform paranemata. The *tetraspores* occur, on different individuals, on the whorled ramelli of all the younger branches. *Colour* a deep brownish-red, becoming brighter in fresh-water. *Substance* soft, but firm and by no means gelatinous, resisting the action of fresh-water. The plant adheres to paper in drying.

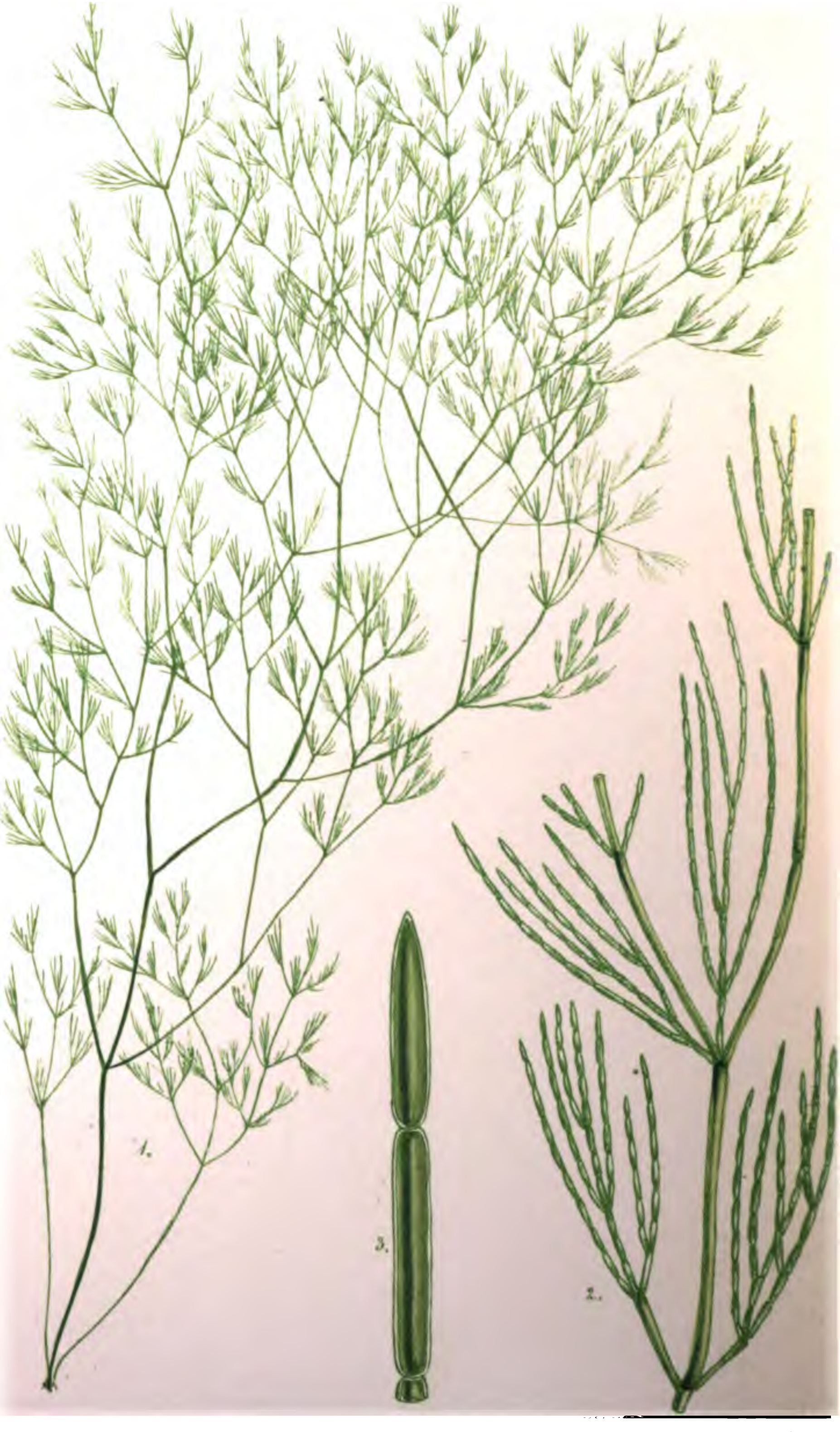
* * *

The species here figured has so completely the habit of a *Dasya*, that it is not to be wondered that Dr. Sonder, who had not seen fructification, should have originally referred it to that genus; nor did I, when editing the 'Nereis Australis,' discover the mistake, although in that work giving a detailed figure of the plant. My recent visit to Australia has put me in possession of numbers of specimens with both kinds of fruit, and enabled me to correct the error.

The genus *Wrangelia*, founded by Agardh on a Mediterranean species, has its greatest development in Australia, where many fine species, of very different external habit, but all agreeing in fructification, have recently been discovered. Several of these we hope to figure in succeeding numbers.

Fig. 1. WRANGELIA VELUTINA,—*the natural size*. 2. Apex of a branch, clothed with ramelli, and bearing a *cystocarp*. 3. Part of the same, with the ramelli removed, the *cystocarp* remaining. 4. Spores and paranemata. 5. Portion of a ramulus, with tetraspores. 6. A tetraspore. 7. A ramellus. 8. Mucronate apex of one of the divisions:—the latter figures more or less *magnified*.

Plate XLVII.



Vincent Brooks Imp.

Plate XLVII.

CLADOPHORA FEREDAYI, *Harv.*

Gen. Char. *Filaments* tufted, articulated, uniform, branched. *Articulations* filled with green, granular endochrome, which is changed at maturity into *zoospores.*—Cladophora (*Kütz.*), from *κλαδος, a branch,* and *φορεω, to bear.*

Fila cæspitosa, articulata, ramosa. Articuli endochromate viridi grumoso demum in zoosporas mutato repleti.

Cladophora *Feredayi;* bright-green, rather rigid (glassy when dry), with a long stipes; filaments very long, setaceous, angularly-flexuous, di-trichotomously decompound and alternately branched, the branches free or interwoven, flexuous, repeatedly divided; ultimate ramuli fasciculate; articulations of the branches very long (20–30 times as long as broad), cylindrical; those of the ramuli 5–6 times their diameter in length, contracted at the nodes.

C. Feredayi; *longiuscule stipitata, lætevirens, siccitate vitreo-nitens, rigidiuscula; filis longissimis setaceis angulatim flexuosis decomposite di-trichotomis et alterne ramosis, ramis nunc discretis nunc intertextis flexuosis pluries divisis, ramulis ultimis dense fasciculatis; articulis ramorum longissime cylindraceis diametro* 20–30-*plo longioribus, ramulorum ad genicula contractis diametro* 5–6-*plo longioribus.*

Cladophora Feredayi, *Harv. Alg. Austr. Exsic. n.* 584.

Hab. Cast ashore from deep water. Georgetown, Tasmania, *Rev. J. Fereday, W. H. H., etc.* Port Phillip, *Mr. Baines, W. H. H., etc.*

Geogr. Distr. Both shores of Bass's Straits.

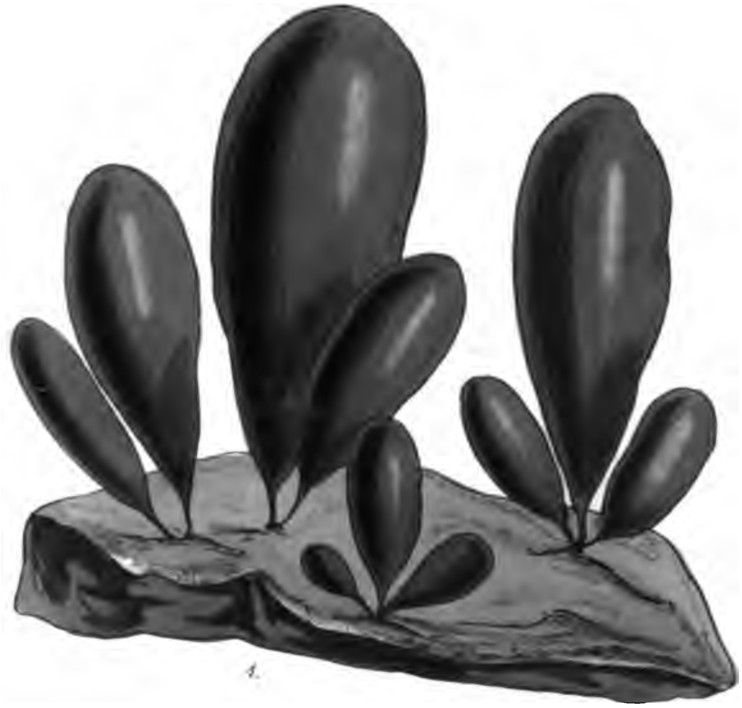
Descr. *Root* a small disc. *Filaments* in dense tufts or bundles, 12–20 inches long or more, with the basal cell (or *stipes*) rising without dissepiment or branch to the height of nearly two inches, then three-forked, and afterwards repeatedly di-trichotomous and irregularly multipartite. The principal branches are angularly bent, elongate, and set with short lateral branches, which are also patent and flexuous. All the smaller branches (except in denuded specimens) bear dense tufts of short setaceous ramuli, two or three lines in length, and of a deeper green than the rest of the filament. The *articulations* in the larger branches are of extraordinary length, the space between each ramification, which is often 1½ inches, and seldom much under 1 inch, being occupied by a single articulation or cylindrical cell: they then vary in length from 20–30 to 50–60 times their own diameter. The articulations of the smaller branches are much shorter, and those of the ramuli are of moderate length, and much contracted at the dissepiments. The terminal cell is subacute. The *colour* is a full grass-green, brilliant in the fresh plant, but paler in the dry state, when the membrane shines with somewhat of a glassy lustre. The *substance* is crisp and rigid, and the branches stand apart by their own rigidity when the tuft is removed from the water. In drying it very imperfectly adheres to paper.

The genus *Cladophora*, as at present limited, is a very extensive one, everywhere dispersed, and containing a multitude of forms or varieties, so difficultly distinguishable, that we hardly know where one "*species*" ends, or where another begins. Whether the fine "species" here figured be really distinct from all others, or only "a remarkable variety," remains to be determined. I content myself with knowing that it is different from any other *Australian* form yet published. If compared with the Australian named kinds, it will stand nearest to *C. Bainesii*, Muell. and Harv., than which it is much larger, stronger, and less soft; and if with the European, it will be nearest to *C. pellucida*.

I have given it the name of Rev. J. Fereday, of Georgetown, Tasmania, from whom, during my stay in his neighbourhood, I experienced much kindness, and who was very frequently my companion in "*weeding*" expeditions, in which he introduced me for the first time to the habitats of *Claudea elegans*, and of many other interesting Algæ. Without his assistance in guiding me to the best localities for the Algæ, and the advantage derived from the use of his boat, I should have greatly failed in my exploration of the Tamar.

Fig. 1. CLADOPHORA FEREDAYI,—*the natural size*. 2. Portion of a branch, with fascicles of ramuli. 3. Articulations from a ramulus:—both figures variously *magnified*.

Plate XLVIII.



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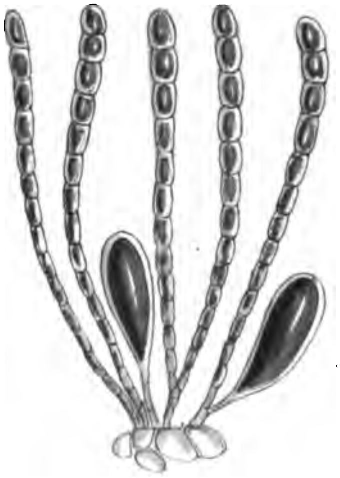

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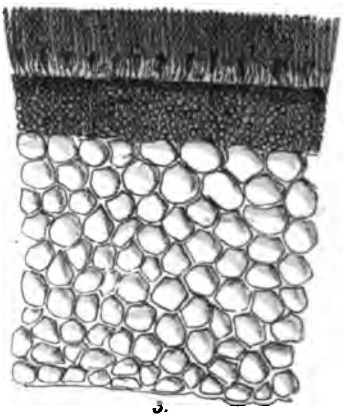

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Vincent Brooks Imp

PLATE XLVIII.

ADENOCYSTIS LESSONII, *Hook. fil. et Harv.*

GEN. CHAR. *Root* scutate. *Frond* membranous, bag-like, hollow or filled with water, coated externally with a velvety stratum of minute, vertical, club-shaped, articulated filaments. *Spores* pyriform, affixed to the superficial filaments.—ADENOCYSTIS (*Hook. fil. and Harv.*), from *αδην, a gland,* and *κυστις, a bladder;* because the bag-like frond is marked with gland-like dots.

Radix scutata. Frons membranacea, saccata, intus cava v. aquâ repleta, punctis glandulæformibus conspersa, extus strato tenui velutino filorum clavatorum omnino velata. Sporæ pyriformes, ad fila peripherica affixæ.

ADENOCYSTIS *Lessonii,* Hook. fil. and Harv.

ADENOCYSTIS Lessonii, *H. fil. and Harv. Fl. Antarct. v.* 1. *p.* 179. *t.* 69. *f.* 2. *J. Ag. Sp. Alg. v.* 1. *p.* 124. *Harv. Alg. Austr. Exsic.*

ASPEROCOCCUS Lessonii, *Bory, in Dup. Voy. p.* 199. *t.* 11. *f.* 2. *Grev. Syn. p.* xlii. *Endl. Gen. Suppl. v.* 3. *p.* 26.

CHORDA Lessonii, *Kütz. Sp. Alg. p.* 549.

HAB. On tidal rocks. At Port Arthur, Tasmania, *W. H. H.*

GEOGR. DISTR. Abundant throughout the Antarctic regions, as at Cape Horn; Kerguelen's Island; Auckland and Campbell Islands, and at Cockburn's Island, lat. 64° S.—*Bory, Dr. Hooker, etc.*

DESCR. *Root* a small, scutate disc. *Frond* 1–3 inches high, rising from a short, filiform stem, obovoid or pyriform, inflated, hollow and empty, or filled with sea-water, of a firmly membranous or coriaceous texture. It is subject to very little variation of form. The *membrane* is formed of two strata of cells, of different sorts; the *inner stratum* being composed of several rows of large, multangular, hyaline, mostly empty cells; the *outer* of several rows of extremely minute, densely packed, coloured cellules, firmly connected together. The membranous frond, thus organized, is further clothed externally with a continuous, velvety pile of very minute, vertical, clavate, articulated filaments; and here and there marked with hemispherical gland-like spots, from which byssoid filaments (sometimes) issue, and which may possibly be connected with the *antheridia.* The *spores* are pyriform, on little stalks, immersed among the peripheric filaments, to whose bases they are affixed. The *colour* of the frond is a very dark brown, the *substance* firm and coriaceous, and the plant scarcely adheres to paper in drying.

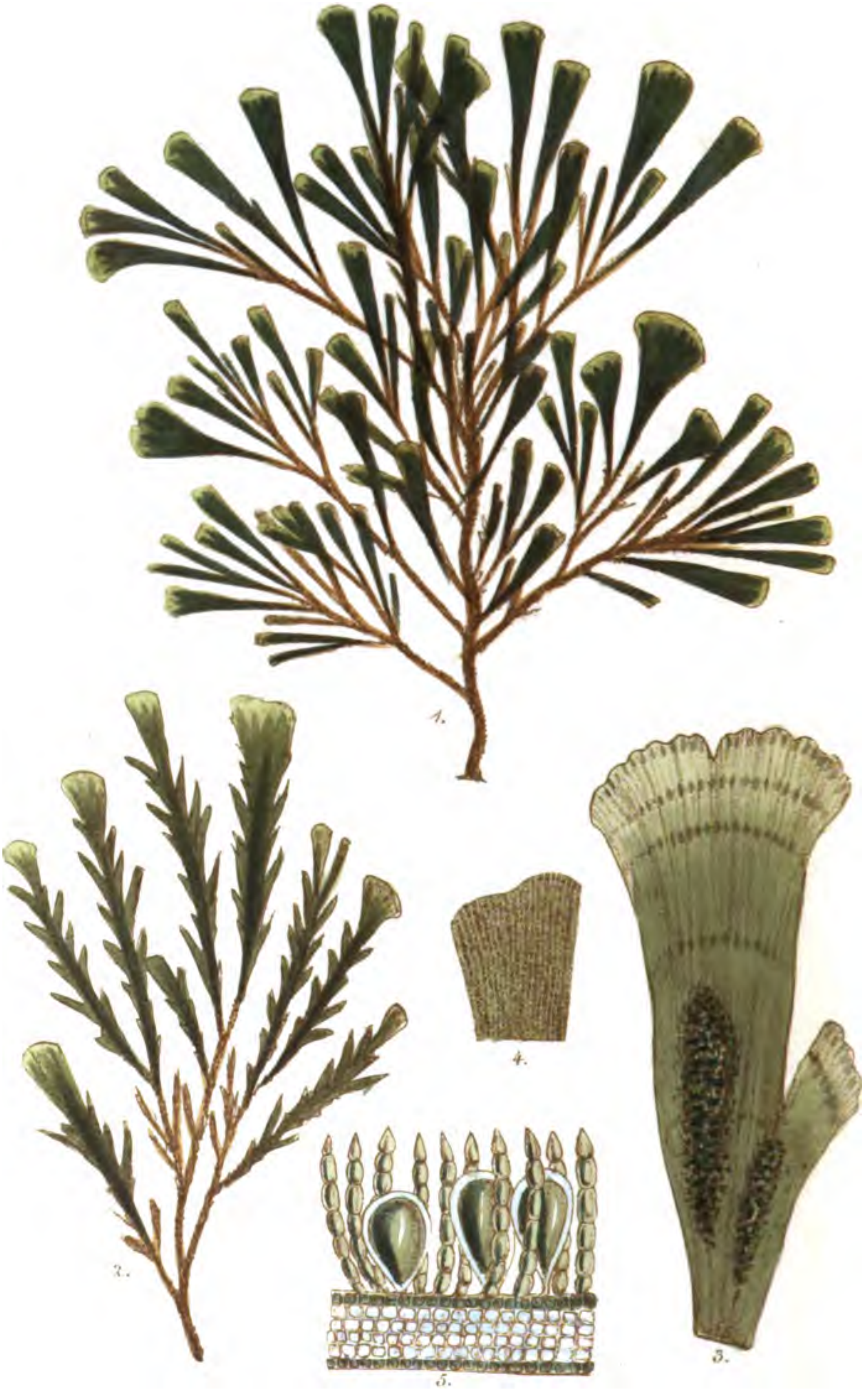
A curious Alga, more nearly allied to the European *Chorda* *filum* than to any other, although very different in external habit. Kützing even places it in the genus *Chorda*, nor is there any very decided character beyond outward form to distinguish it.

The analysis now given shows that there is also a strong natural affinity to the genus *Chordaria*, so strong that I am induced to propose the removal of both *Chorda* and *Adenocystis* from the *Laminarieæ*, where they are placed by Agardh, to the *Chordarieæ*, with which, in structure, and the nature and evolution of the spores, they more closely agree. In external aspect also they accord better with *Chordarieæ* than with any genuine Laminarian genus.

Adenocystis Lessonii is interesting as an Antarctic plant, extremely abundant on the inhospitable coasts near Cape Horn, and one of the few Algæ discovered on the still more barren Cockburn Island, and which reaches its northern limits near the southern point of Tasmania. In the Antarctic regions Dr. Hooker usually found it in rock-pools; but at Port Arthur it as often grows on the bare rock. When dried up, on the recess of the tide, its bag-like fronds become inflated and glossy.

Fig. 1. Fronds of ADENOCYSTIS LESSONII, on a piece of rock,—*the natural size.* 2. Small portion of the membrane, showing the glandular spots. 3. Section through the membrane. 4. Spores and peripheric filaments:—the latter figures variously *magnified.*

Plate XLII.



Vincent Brooks Imp

PLATE XLIX.

ZONARIA SINCLAIRII, *Hook. fil. et Harv.*

GEN. CHAR. *Root* woolly. *Frond* flat, ribless, coriaceo-membranaceous, flabelliform, entire or vertically multifid; the surface-cellules set in longitudinal lines, radiating from the base of the segments. *Fructification: spores* superficial, collected in spot-like *sori*, and mixed with jointed paranemata.—ZONARIA (*Ag.*), from ζώνη, *a zone* or *girdle*; because the frond, in many species, is marked with distant, concentric lines.

Radix stuposa. Frons plana, ecostata, coriaceo-membranacea, flabellata, integra v. multisecta; cellulis superficialibus in lineas longitudinales e basi laciniarum radiantes ordinatis. Fruct., sporæ in soros maculiformes collectæ, paranematibus articulatis stipatæ.

ZONARIA *Sinclairii*; erect; stem terete, slender, woolly, much branched; branches ending in narrow, wedge-shaped, basally attenuated, entire or inciso-pinnatifid segments; sori oblong or linear, longitudinally extending.

Z. Sinclairii; *erectiuscula; stipite terete gracili stuposo ramosissimo; ramis elongatis in laminas anguste cuneatas basi attenuatas integras v. inciso-pinnatifidas abeuntibus; soris oblongis linearibusve.*

ZONARIA Sinclairii, *Hook. fil. et Harv. in Lond. Journ. Bot. v.* 4. *p.* 530. *Hook. fil. Fl. Nov. Zeal. v.* 2. *p.* 218. *J. Ag. Sp. Alg. p.* 111. *Harv. Alg. Austr. Exsic. n.* 82.

STYPOPODIUM Sinclairii, *Kütz. Sp. Alg. p.* 564.

HAB. In rock-pools, between tide-marks. Newcastle, New South Wales, abundant, *W. H. H.*

GEOGR. DISTR. New Zealand, *Dr. Sinclair.*

DESCR. *Root* an expanded, broadly conical disc, covered with rigid, woolly, rust-coloured hairs. *Fronds* tufted, erect, 2–4 inches high, with a flabelliform outline, much branched. *Stem* and *branches* filiform, clothed with ferruginous tomentum, the latter setaceous, the former as thick as whipcord. *Branches*, or their divisions, ending in vertical, narrow wedge-shaped laminæ, an inch to an inch and a half in length, and from ¼–⅓ inch wide at the top, tapering at base, rounded, inclining to fan-shaped at the apex, which is pale and semi-transparent, like horn, smooth, except where joined to the branch, marked with obsolete transverse concentric zones, and finely striated with longitudinal radiating lines. Two forms of frond occur, often in the same tide-pools. In one (as our fig. 1), the laminæ are quite simple and perfectly entire at the sides; in the other (fig. 2), the sides of the laminæ are more or less deeply lacerated in an oblique direction, ascending from a medial line to the margin. In these latter individuals the colour is more opaque, somewhat glaucous, with a cupreous lustre, and the surface is more strongly striate. Intermediate forms may be found. *Fruit*, observed only on the first noticed variety, consists of large, effuse, oblong or linear sori, one or two, rarely more, bursting through the surface of each fertile lamina, near its base; the *spores* are obovoid, and lie among closely set, erect, jointed threads or *paranemata*. The *colour* is a deep greenish-olive, sometimes glaucous, and somewhat foxy in age. The *substance* is rigid, and the plant does not adhere to paper in drying.

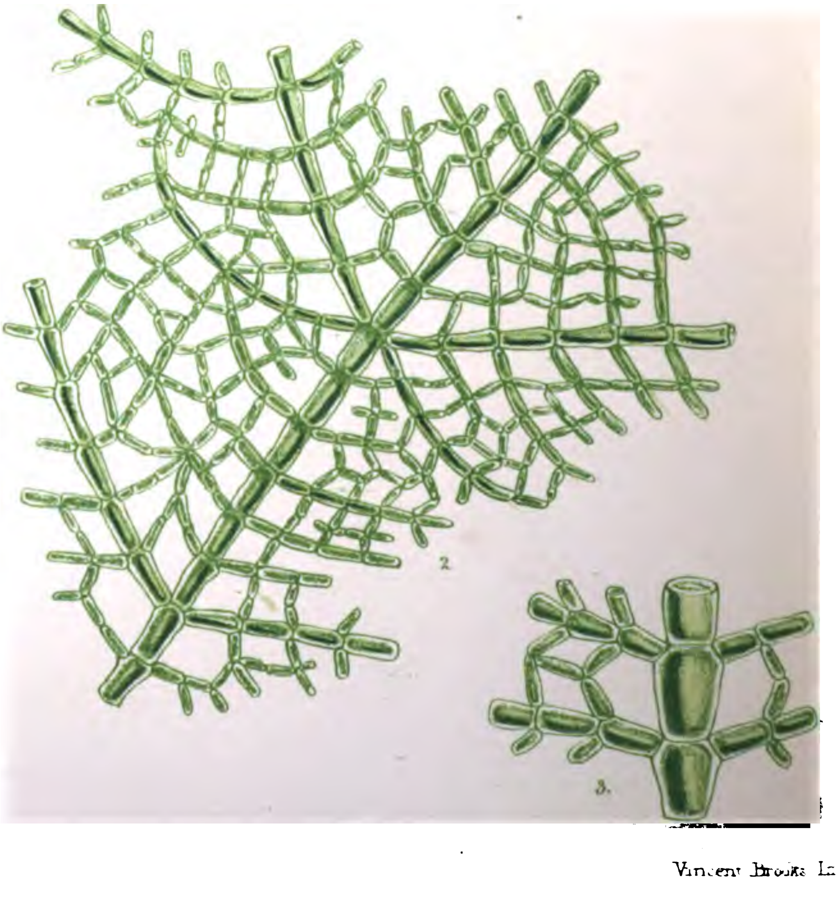
This pretty species was originally described from a few fragmentary specimens sent by Dr. Sinclair from New Zealand. It is therefore satisfactory, on receiving more complete and numerous specimens, to have but little to alter in our former description. The chief matter to add is to notice the laciniated variety (fig. 2), which, if it came from a different locality, might pass for another species. Having however seen both varieties growing together in abundance, and observed intermediate forms between them, I have no hesitation in regarding them as specifically the same.

Z. Sinclairii differs from its nearest allies in the elongated, thread-like stems and branches, and in the very narrow segments; which, though laterally fimbriated, are seldom vertically cloven.

Fig. 1. ZONARIA SINCLAIRII; normal form. 2. Lacerated variety:—both of the *natural size*. 3. Upper portion of a lamina, with *sori*. 4. Small portion, to show the surface-cells. 5. Section of *frond*, and *sorus*, showing spores and paranemata *in situ*:—the latter figures more or less *magnified*.

Plate L.

1.



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Vincent Brooks Imp

PLATE L.

MICRODICTYON AGARDHIANUM, *Dne.*

GEN. CHAR. *Frond,* a sessile, expanded, amorphous, filmy network, formed of distichously branched, anastomosing filaments. *Endochrome* green, thin and watery.—MICRODICTYON (*Dne.*), from *μικρος, small,* and *δικτυον, a net.*

Frons retiformis, sessilis, expansa, amorpha, ex filis confervoideis articulatis disticke ramosis anastomosantibus conflata. Succus aquosus, viridis.

MICRODICTYON *Agardhianum;* frond rather rigid, irregularly expanded; filaments trichotomous, the principal branches patent, ramuli irregularly anastomosing; articulations about twice as long as broad.

M. Agardhianum; *fronde rigidiuscula vage expansa; filis trichotomis, ramis patentibus ramulisque reticulatim confluentibus; articulis diametro 2–3-plo longioribus.*

MICRODICTYON Agardhianum, *Dne. Pl. Arab. p.* 115. *Endl.* 3*rd Suppl. p.* 14. *Kütz. Sp. Alg. p.* 511. *Harv. Alg. Austr. Exsic. n.* 568.

MICRODICTYON Velleyanum, *Dne. l. c.*

HYDRODICTYON umbilicatum, *Ag. Syst. p.* 85.

CONFERVA umbilicata, *Velley, Linn. Trans. v.* 5. *p.* 169. *t.* 7.

HAB. Abundant throughout Port Jackson, and in the Paramatta River, in June, *W. H. H.*

GEOGR. DISTR. Mediterranean Sea; Red Sea; Trincomalee, Ceylon!; Sandwich Islands; Friendly Islands. (Canary Islands?)

DESCR. *Frond* from 1–12 inches broad, of no certain outline, lying flat on the surface of rocks or mud, unattached, or fixed to Algæ and Corallines by several points of its lower surface; wholly composed of confervoid, articulated, anastomosing filaments, and comparable either to a network with irregular meshes, or to a skeleton leaf. The *filaments* composing the net are not all of uniform size. There is evidently a groundwork of closely reticulated, slender fibres, traversed in various directions by trichotomous, patently branched filaments of larger diameter, which may be called ribs and veins, the smaller ones being veinlets. The closeness of the network varies in different specimens, consequently also the size and length of the component cellules. Usually the *cells* are about 2–3 times as long as broad, cylindrical or somewhat conical. When the plant is fresh, the cells are filled with a bright-green, watery endochrome, which is dispersed in drying, in which state the frond turns of a dull, dingy or blackish green. The *substance,* when fresh, is crisp and rigid, and very easily torn. Notwithstanding its delicacy, the plant very imperfectly adheres to paper in drying.

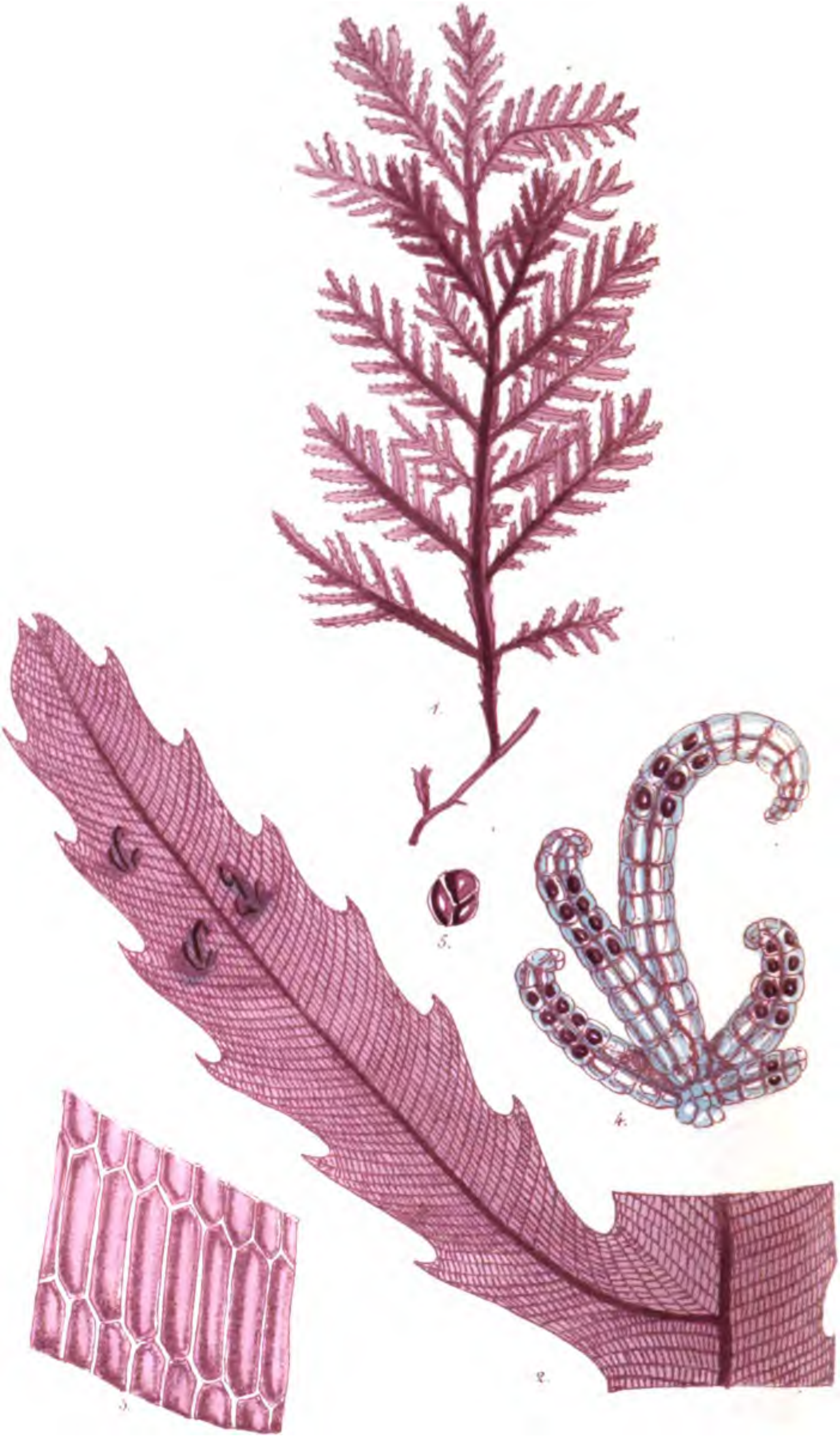
* * *

We have here an Alga allied on the one hand to *Struvea*, from which it abundantly differs in the absence of stipes, and in want of symmetry of parts; and on the other, to *Anadyomene*, from which the different arrangement of its component cells separates it. A similarity, too, with the oppositely branched *Cladophoræ*, some of which have anastomosing ramuli, may be recognized.

Probably the Sydney specimens would be referred by Decaisne to his *M. Velleyanum*, but on comparing with specimens from the Mediterranean and the Friendly Islands, I am unable to detect any specific character between them. If I judged from the figure given by Montagne of his *Anadyomene Calodictyon* (*M. Calodictyon*, Dne.), I should be disposed to include it also as a synonym; but, not having seen an authentic specimen, I abstain from reducing that species. It seems, however, improbable that, in a genus consisting of two very closely allied species, one should have so very wide a range as to be found in the Mediterranean, the Indian Ocean and the Pacific, and the other to be confined to a single rock-pool in the Island of Teneriffe.

Fig. 1. MICRODICTYON AGARDHIANUM,—*the natural size*. 2. Portion of the network,—*magnified*. 3. A few cells, from the same,—*more highly magnified*.

Plate II.



Vincent Brooks Imp.

PLATE LI.

AMANSIA KUETZINGIOIDES, *Harv.*

GEN. CHAR. *Frond* flat, midribbed, pinnatifid, transversely striate, membranaceous; the membrane formed of oblong, hexagonal cells, of equal length, arranged in obliquely transverse lines or striæ, destitute of cortical cellules. *Fructification:* 1, ovate or globose *ceramidia*, containing a tuft of pear-shaped spores; 2, simple or branched, marginal or superficial *stichidia*, containing *tetraspores* in a double row.—AMANSIA (*Lamour.*), in honour of M. Amans, a French algologist.

Frons plana, costata, pinnatifida, transversim striata, membranacea; lamina ex cellulis oblongis hexahedris æqualibus oblique-transversim ordinatis conflata; cellulis corticalibus nullis. Fruct.: 1, *ceramidia;* 2, *stichidia marginalia v. superficialia, tetrasporas biseriatas foventia.*

AMANSIA *Kuetzingioides;* stem cartilaginous, terete, branched; branches strongly costate, bipinuatifid and proliferous from the midrib; pinnæ oblong, with a slender nerve, alternately pinnatifid, the pinnules linear, erecto-patent, serrate; apices straight; stichidia superficial, tufted, linear, incurved.

A. Kuetzingioides; *caule cartilagineo terete ramoso basi denudato sursum alato; ramis valide costatis bipinnatifidis et a costa proliferis; pinnis oblongis tenuissime costatis alterne pinnatifidis, pinnulis linearibus argute serratis; apicibus strictis; stichidiis superficialibus cæspitosis linearibus hamatis.*

KUETZINGIA serrata, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 538; *Alg. Austr. n.* 182.

HAB. Cast ashore. Rottnest Island, Western Australia, *W. H. H.*

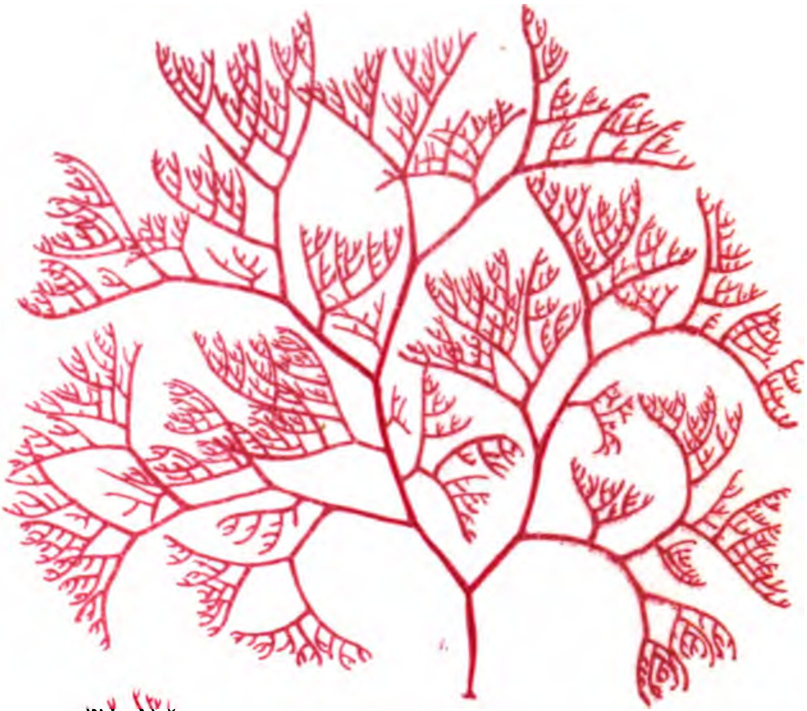
DESCR. *Root* unknown. *Frond* (probably) much branched. The *stem* is cartilaginous, as thick as whipcord, opaque, destitute of bordering membrane. The lower part of the branches is similar, but the upper is bordered by a narrow, serrated, membranous wing, and closely set with horizontally patent, distichous or irregularly inserted laciniæ. These *laciniæ* are delicately membranous, traversed by a very slender midrib, obliquely transversely striate, and more or less deeply pinnatifid; the younger ones are simply serrate, the older incised, and the fully-developed regularly pinnatifid; the outline is oblong or obovate. The *pinnules*, or ultimate segments, are about a line broad, and sharply serrate, minutely bifid, and quite straight (not involute) at the apex. Under the microscope the *membrane* is shown to be composed of hexagonal cells, about four times as long as broad, symmetrical and of equal size, and separated by pellucid lines. The *stichidia* are scattered on the surface of the lamina, tufted, linear-attenuate, hooked at the point, and contain a double row of tetraspores. The *colour* is a brownish red. The *substance* is rigid and membranous, and the plant does not adhere to paper in drying.

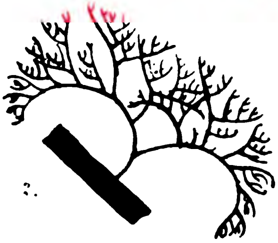
This has so much the colour and the external aspect of *Kuetzingia canaliculata*, that I formerly described it as a species of *Kuetzingia;* nor till I had examined it more carefully, under the microscope, did I notice the difference in structure. The structure of the membrane is exactly that of an *Amansia*, and the fruit, so far as known, sufficiently accords. Most *Amansiæ* however have involute apices to the segments and their divisions; and the stichidia rise, not from the lamina, but from the lateral teeth. Here, as in *Kuetzingia*, the apices are straight, and the stichidia spring from the surface of the leaf.

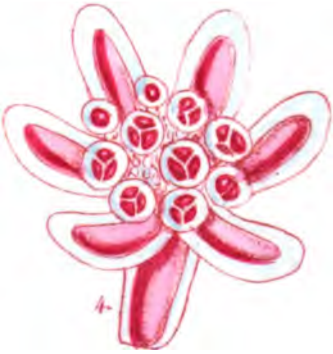
This appears to be a very rare plant. I only obtained a single specimen during my visit to Australia, and it has not been sent to me by my indefatigable friend and contributor Mr. Clifton. Its characters are so marked that it cannot be confounded with any other Australian species.

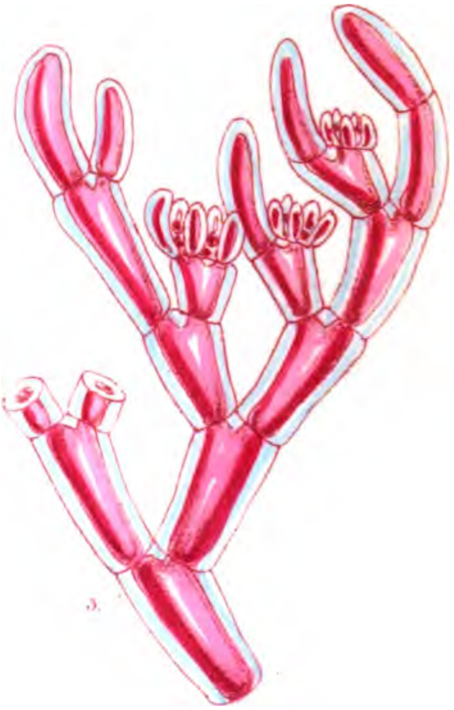
Fig. 1. AMANSIA KUETZINGIOIDES,—*the natural size.* 2. A pinnule, bearing tufts of *stichidia.* 3. Portion of the membrane, to show the hexagonal cells of which it is composed. 4. A tuft of stichidia. 5. A tetraspore:—the latter figures more or less *magnified.*

Plate LII.









Vincent Brooks Imp.

Ser. Rhodospermeæ. Fam. *Ceramiaceæ.*

Plate LII.

GRIFFITHSIA BINDERIANA, *Sond.*

Gen. Char. *Frond* filiform, dichotomous, articulated, monosiphonous, naked. *Fructification:* 1, involucrate *favellæ,* containing numerous angular spores; 2, *tetraspores* attached to the inner faces of involucral ramelli, globose, triangularly parted.—Griffithsia (*Ag.*), in honour of the late Mrs. Griffiths, of Torquay, Devonshire.

Frons filiformis, dichotoma, articulata, monosiphonia, ecorticata. Fruct.: 1, *favellæ involucratæ sporas numerosas angulatas foventes;* 2, *tetrasporæ triangule divisæ interiore latere involucri, ramellis pluribus constituti seriatæ.*

Griffithsia *Binderiana;* frond flabelliform, distichously much branched, fastigiate; branches cymoso-dichotomous, recurved, the minor divisions unilateral; apices incurved; axils spreading; articulations subcylindrical, scarcely contracted at the nodes, 2–3 times as long as broad; fertile ramuli on the inner side of the branches, solitary or secund, usually of a single cell, crowned with an umbellate involucre enclosing numerous tetraspores.

G. Binderiana; *fronde flabellata disticha ramosissime fastigiata; ramis cymoso-dichotomis recurvis, segmentis minoribus secundis; apicibus incurvis; axillis patentibus; articulis cylindraceis ad genicula vix contractis diametro 2–3-plo longioribus; ramulis fructiferis interiore latere segmentorum solitariis vel secundis unicellularibus, involucro umbellato tetrasporas numerosas amplectente coronatis.*

Griffithsia Binderiana, *Sond. Pl. Preiss. v.* 2. *p.* 168. *Kütz. Sp. Alg. p.* 660. *J. Ag. Sp. Alg. v.* 1. *p.* 86. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 559; *Alg. Exsic. Austr. n.* 494.

Hab. Parasitical on *Zostera,* and on various Algæ, beyond tide-marks. Swan River, *Preiss!* Rottnest Island and Garden Island, Western Australia, *W. H. H., G. Clifton, Esq.*

Geogr. Distr. Western Australia.

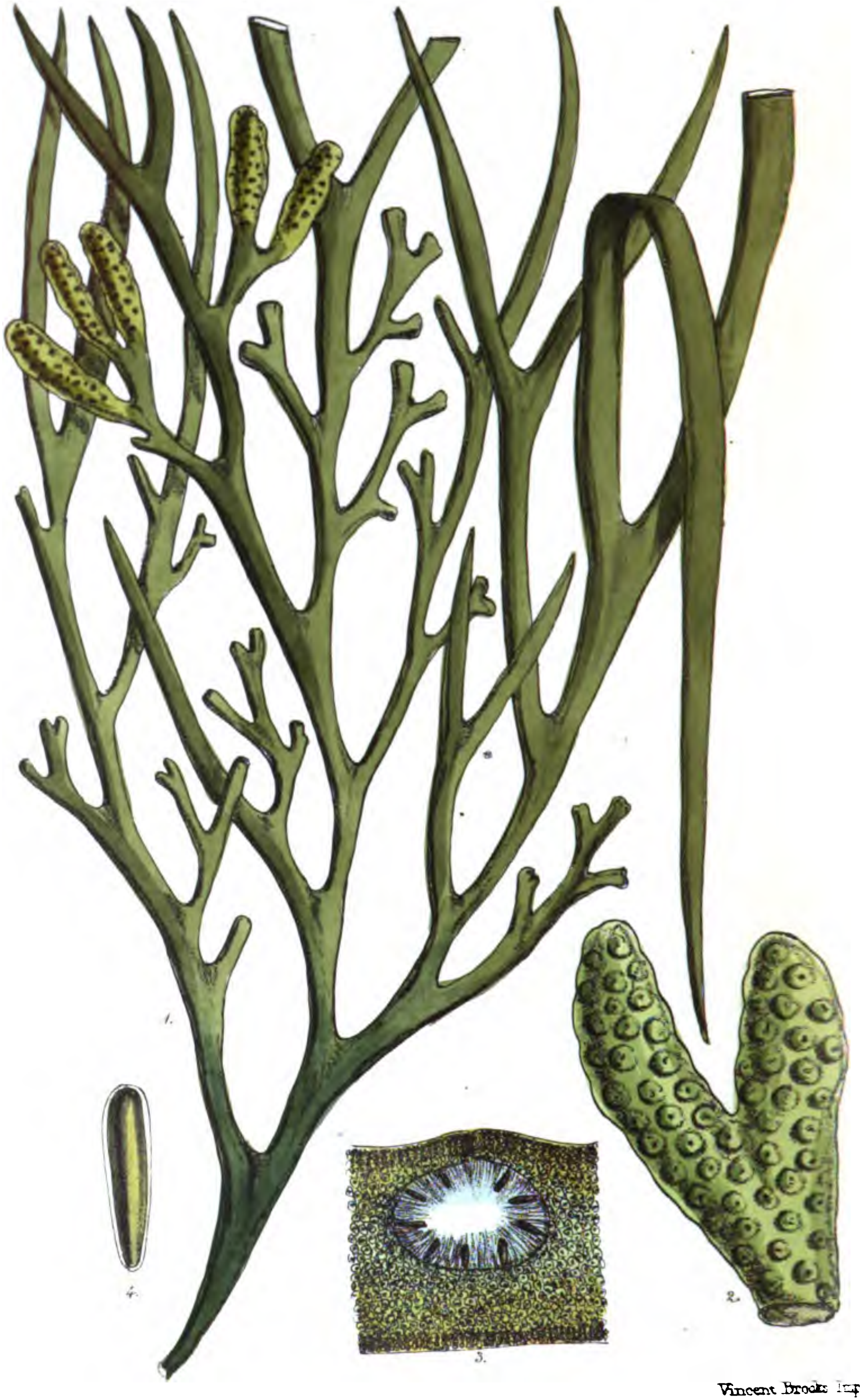
Descr. *Root* a small disc. *Fronds* solitary or slightly tufted, 2–4 inches high, as thick as hog's-bristle, perfectly distichous, repeatedly but not regularly dichotomous, with a broadly flabelliform outline, the major and minor divisions fastigiate. The principal ramifications are very patent, with a tendency to produce dichotomous ramuli on the upper or inner faces of each segment; thus old specimens present a mixture of dichotomous and secund ramification, resembling that of an irregular, somewhat scorpioid, but much divided cyme. All the *axils* are patent; the *main branches* are frequently divaricate; and the *apices* are very often incurved, and sometimes involute. The *articulations* are nearly cylindrical, and rarely exceed thrice their diameter in length; the *endochrome*, in the older portions of the branch, occupies about one-third of the breadth. The *involucres* (of tetraspores) are usually borne on short, lateral, somewhat conical ramelli, consisting of a single cell, nearly as broad as long, but sometimes a second cell rises from the apex, by the side of the involucre. The *tetraspores* are numerous in each involucre. *Favellæ* not observed. The *colour* is a fine crimson-lake, discharged in fresh-water. The *substance* is firm, somewhat rigid when fresh; soon becoming soft in the air, and when dry the plant closely adheres to paper, and has a silky gloss.

A very beautiful species when well grown; and sufficiently marked by its broadly flabellate, distichous habit, and the recurved or divaricating ramification. It must be admitted, however, as Professor J. Agardh remarks, that it is closely related to the European *G. secundiflora;* and consequently to its southern representative *G. antarctica.* Whether future observations will not show that these three should be united, remains to be seen.

Whilst collecting at Fremantle, I observed a marked difference in size and luxuriance between the specimens of this plant found at Garden Island and those from Rottnest. The first grew on *Algæ,* the latter on *Zostera.* Our fig. 1 is taken from one of the former; fig. 2, from one of the latter; and these figures represent the average differences, which may perhaps be explained by the difference of parasitism. The two islands are only a few miles apart.

Fig. 1 and 2. GRIFFITHSIA BINDERIANA,—*the natural size.* 3. Portion of a branch, with involucres *in situ.* 4. An involucre, removed, and forced open to show the enclosed tetraspores:—the latter figures *magnified.*

Plate LIII.



Vincent Brooks Imp.

Plate LIII.

FUCODIUM GLADIATUM, *J. Ag.*

Gen. Char. *Frond* dichotomous, ribless, cylindrical or compressed. *Vesicles,* when present, innate, simple. *Receptacles* terminal or lateral, formed from swollen apices of the branches. *Spore-cavities* hermaphrodite or polygamous. *Spores* obovoid, sessile. *Paranemata* simple.—Fucodium (*J. Ag.*), altered from *Fucus,* and signifying "like a Fucus."

Frons dichotome ramosa, ecostata, cylindracea v. compressa. Vesiculæ (sæpe deficientes) innatæ, simplices. Receptacula terminalia v. lateralia, succosa, ex apicibus ramorum transmutatis orta. Scaphidia hermaphrodita v. polygama. Sporæ obovoideæ, sessiles. Paranemata simplicia.

Fucodium *gladiatum;* stem terete, compressed upwards, and passing into a flat, linear, repeatedly dichotomous frond; ultimate segments very long, ensiform or ligulate, attenuate; vesicles none; receptacles forked.

F. gladiatum; ***stipite terete mox in frondem applanatam linearem repetite dichotomam desinente; segmentis ultimis longissimis ensiformibus ligulatisve attenuatis acutis; vesiculis nullis; receptaculis furcatis, nunc elongatis dichotomisque.***

Fucodium gladiatum, *Ag. Sp. Alg. v.* 1. *p.* 202. *Harv. Alg. Austr. Exsic. n.* 33.

Xiphophora Billardieri, *Mont. Pôl. Sud, p.* 55. *t.* 7. *f.* 1. *Hook. et Harv. Fl. Ant. v.* 1. *p.* 176. *t.* 69. *f.* 3; *Fl. Nov. Zeal. v.* 2. *p.* 215.

Himanthalia gladiata, *Kütz. Sp. Alg. p.* 587.

Fucus gladiatus, *Labill. Nov. Holl. v.* 2. *p.* 111. *t.* 256. *Turn. Hist. t.* 240. *Ag. Sp. Alg. v.* 1. *p.* 97; *Syst. p.* 279.

Hab. On rocks and stones, near low-water mark. Abundant at Western Port, Victoria, and at Port Arthur, Tasmania, *W. H. H., etc.*

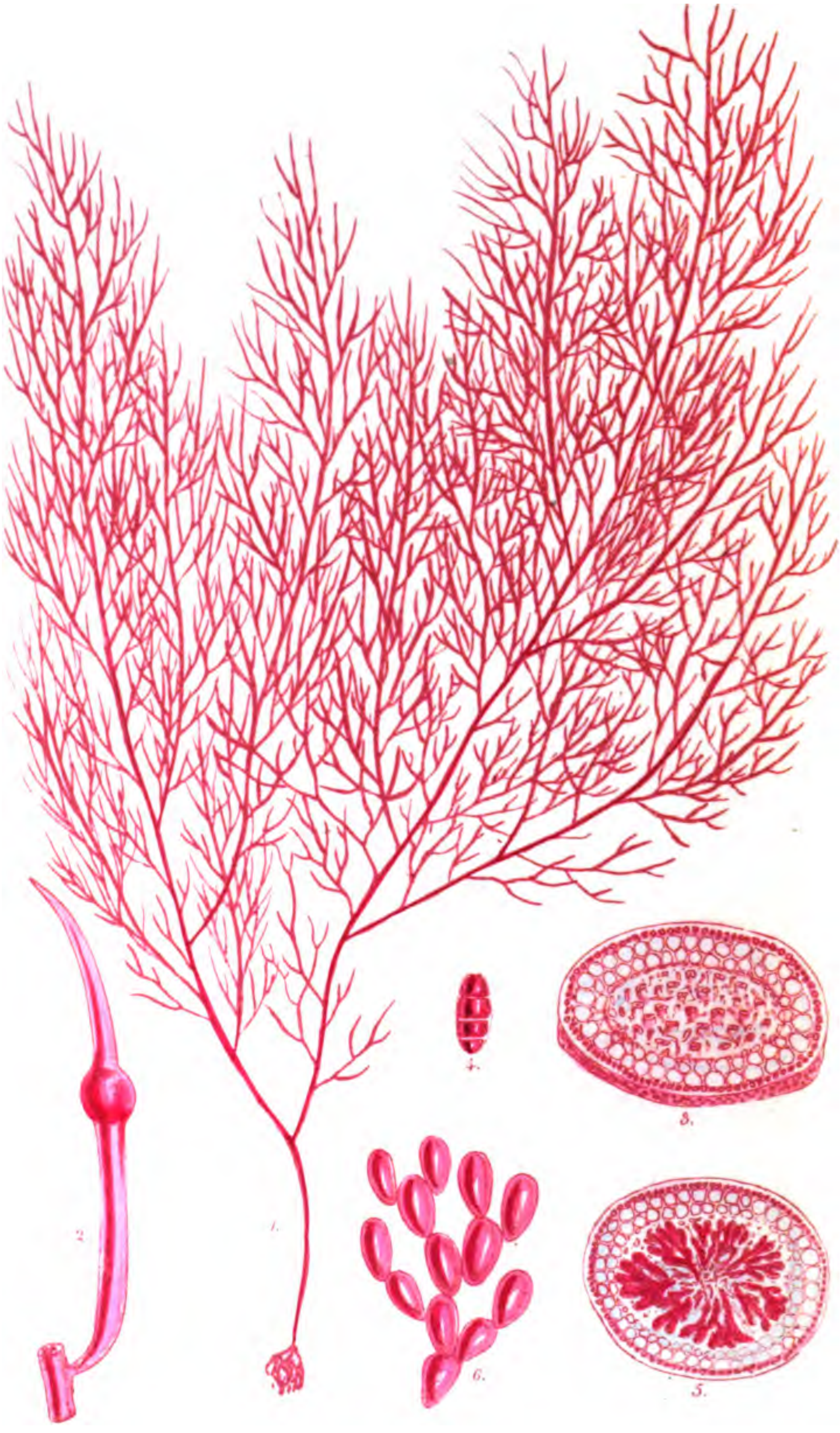
Geogr. Distr. South coasts of Australia and Tasmania. New Zealand.

Descr. *Root* discoid. *Stem,* or stipe, nearly terete, soon becoming compressed, and then passing into the base of a compressed or flattened, linear frond. *Frond* 1–2–3 feet long, linear and dichotomous, but very variable in the degree of ramification, in the breadth of the branches, and in the angles at which the segments issue. In a young state the dichotomies are very frequent, and pretty regular, and the ramification is tolerably fastigiate; but after passing the earlier stages, the branches are more distantly forked, and the ultimate segments, when fully developed, are prolonged to several inches. The breadth varies from one to four or five lines, the narrower forms being much less flattened than the wider. In some states the forked portion of the frond is only two or three inches long, while the ultimate segments are 14–20 inches in length. The *main branches* often throw out lateral dichotomous ramuli, and these are sometimes so abundant that the frond becomes quite bushy. The *receptacles* vary as much as the branches; sometimes they are short, and simple or once forked, sometimes elongated and repeatedly branched, or the whole upper portion of a branch is converted into a receptacle. The *colour* is a dark-olive, becoming black in drying. The *substance* is leathery when recent, horny when dry.

An extremely variable species, of which we here represent what may be called the normal form, to which the different varieties may be reduced, by supposing the terminal laciniæ very much longer, and more strap-like; the frond not half as wide; the branching more copious and less regularly dichotomous; and the lateral ramuli in excess, and multifid. Still, all the varieties bear a common character, which, though it may deceive in the herbarium, can never seriously puzzle an observer on the shore. We must however caution our friends that there is another allied species, *F. chondrophyllum*, which may be mistaken for the present, but which differs in never producing the long; strap-shaped laciniæ, and in some other characters, which will be best explained when we figure it.

Fig. 1. FUCODIUM GLADIATUM,—*the natural size.* 2. Top of a receptacle. 3. Transverse section of the same, showing one of the spore-cavities. 4. A spore:—the latter figures *magnified.*

Plate LIV.



Vincent Brooks Imp.

PLATE LIV.

RHABDONIA COCCINEA, *Harv.*

GEN. CHAR. *Frond* filiform, decompound, imperfectly tubular; tube partly filled with longitudinal, branching and anastomosing filaments; peripheric stratum composed of polygonal cellules, smaller toward the circumference. *Fructification:* 1, *conceptacles* immersed in the branches, suspended among the axial filaments and enclosed in a network of filaments, containing moniliform strings of spores, radiating from a central placenta; 2, zonate *tetraspores* dispersed through the superficial stratum.—RHABDONIA (*Harv.*), from *ῥαβδος, a twig;* in allusion to the twiggy ramification of the species.

Frons filiformis, decomposite ramosa, tubulosa; tubo filis longitudinalibus ramosis anastomosantibus percurso; strato peripherico ex cellulis angulatis superficiem versus minoribus contexto. Fruct.: 1, *cystocarpia infra stratum periphericum suspensa, reticulo filorum velata, carpostomio demum aperta, fila sporifera moniliformia a placenta centrali emissa continentia:* 2, *tetrasporæ zonatim divisæ, per ramos minores sparsæ, immersæ.*

RHABDONIA *coccinea;* frond bright-red, stipitate, dendroid, very much branched and bushy; branches several times alternately divided, all the divisions tapering to an acute point and constricted at base; conceptacles immersed in the ramuli.

R. coccinea; *fronde rubro-coccinea stipitata dendroidea dense ramosissima; ramis pluries alterne divisis, ramulis basi constrictis apice attenuatis acutis; cystocarpiis ramulis ultimis immersis.*

RHABDONIA coccinea, *Harv. in Hook. Lond. Journ. Bot. v.* 6. *p.* 408. *Kütz. Sp. Alg. p.* 728. *J. Ag. Sp. Alg. v.* 2. *p.* 534.

RHABDONIA Harveyi, *Sond. in Linn. v.* 25. *p.* 681 (*pro parte*).

CHRYSYMENIA coccinea, *Harv. Lond. Jour. v.* 3. *p.* 448.

HAB. Cast ashore from deep water. At Georgetown, Tasmania, *Mr. Gunn, W. H. H., etc.;* and at Brighton beach, Port Phillip, *W. H. H.* Common.

GEOGR. DISTR. South coast of New Holland. Tasmania.

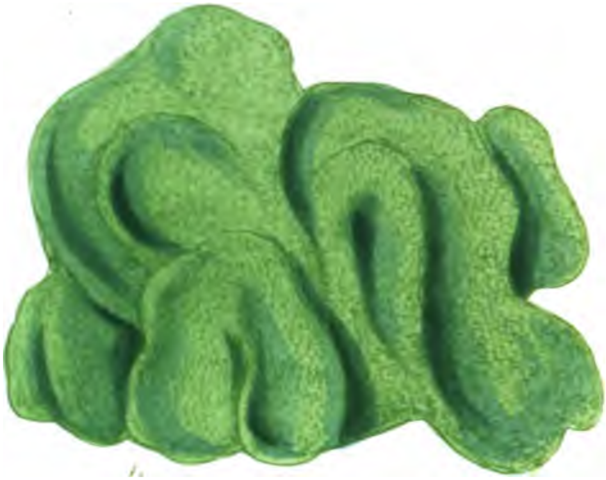
DESCR. *Roots,* a mat of creeping, branched, twisted fibres. *Fronds* tufted, 6–10–12 inches high, as thick or twice or thrice as thick as hog's-bristle, cylindrical, attenuated upwards. The *stem* generally rises to the height of 1–3 inches before it emits branches; from thence to the summit it is closely set with alternate, or irregularly inserted branches, directed to all sides.

The general aspect is that of a tree. The *branches*, in well-grown specimens, are 3–6 inches long, ovate in outline, and several times decompounded, the lesser divisions springing very irregularly, and the main rachides being more or less zigzag. All the angles are acute, and the branches and ramuli more erect than patent. The smaller ramuli are evidently constricted at their insertion, and taper to an acute point. The *conceptacles* occur sparingly in the ramuli, one in each fertile ramulus, towards its centre; they are globose, and of nearly twice the diameter of the part where they occur. The *tetraspores* are more common, and are dispersed through the smaller divisions of fronds that produce them. The number of *axial filaments* in the tube varies with the age of the specimen; being few and distant in young parts, and densely crowded in old; the larger peripheric cells are generally in a double row. The *colour* when growing is a deep full red, which becomes a brilliant crimson (retained in drying) if the plant be steeped in fresh-water. The *substance* is cartilaginous and rather soft; and the plant generally adheres closely to paper in drying.

The genus *Rhabdonia* is in many respects closely allied both to *Areschougia* and *Erythroclonium*, but differs in the want of a principal axial filament. It agrees in structure and habit with *Solieria*, but differs essentially in the structure of its conceptacles.

The species here figured is that on which the genus was originally founded, to which others, Australian and American, have since been added. Having had full opportunity in Australia and Tasmania of studying *R. coccinea* and *R. nigrescens* in a fresh state, I cannot agree with my friend Sonder in uniting them. One invariably becomes brilliant, and the other becomes darker in fresh-water, and in drying, and the habit and substance are also somewhat different.

Fig. 1. RHABDONIA COCCINEA,—*the natural size*. 2. A ramulus with an imbedded conceptacle. 3. Cross section of the frond. 4. A tetraspore. 5. Cross section of a conceptacle. 6. One of the spore-threads removed:—the latter figures variously *magnified*.



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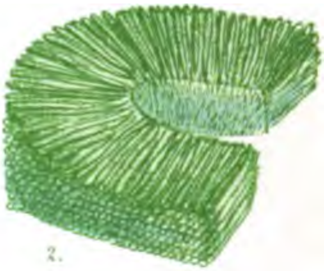

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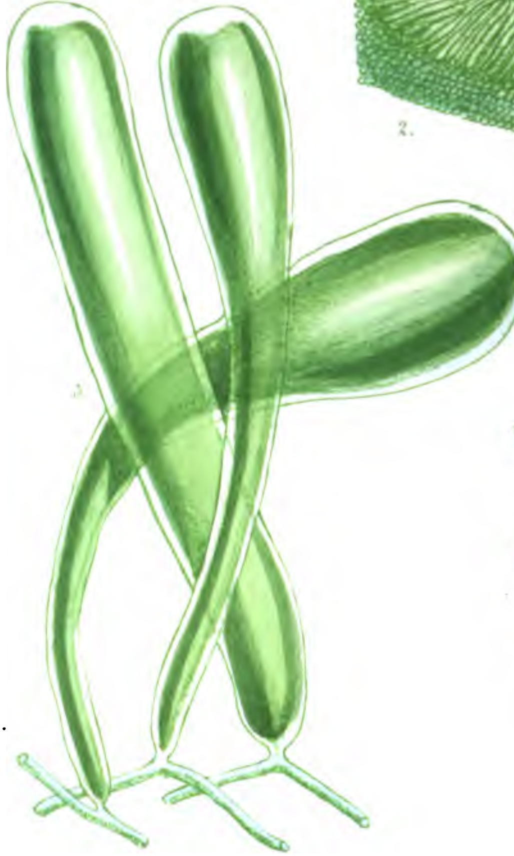

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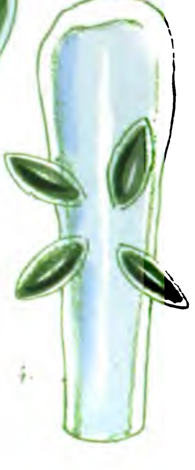

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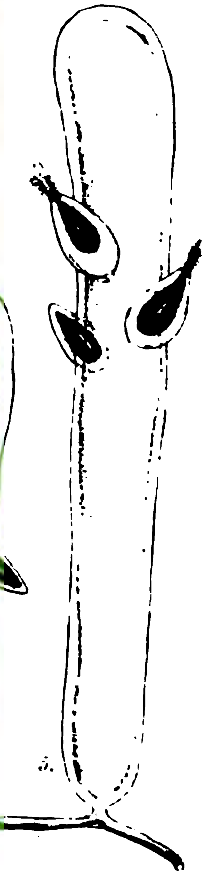

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PLATE LV.

CODIUM SPONGIOSUM, *Harv.*

GEN. CHAR. *Frond* sponge-like, composed of a plexus of unicellular branching filaments, filled with green, semifluid endochrome. *Fructification:* lateral *sporangia*, borne on the peripheric ramuli, and containing innumerable zoospores.—CODIUM (*Stackh.*), from *κωδιον, the skin of an animal.*

Frons spongiomorpha, e plexu filorum unicellulorum ramosorum conflata; endochromate lætivirente grumoso. Fruct., sporangia propria, lateralia, ex ramulis periphericis enata, zoosporas indefinitas foventia.

CODIUM *spongiosum;* frond sessile, soft, polymorphous, variously lobed, sponge-like; interior filaments laxly set in slimy matter; peripheric cylindrical or pyriform, obtuse; sporangia fusiform, acute at both extremities.

C. spongiosum; *fronde sessili molli polymorpha varie lobata et spongioidea; filis interioribus laxiusculis in gelatina immersis, periphericis cylindraceis v. pyriformibus obtusis; spermatiis fusiformibus utrinque acutis.*

CODIUM spongiosum, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 565; *Alg. Austr. Exsic. n.* 577.

HAB. On rocks and shells, etc., near low-water mark. King George's Sound, very common; also at Rottnest, W. Austr., *W. H. H.*

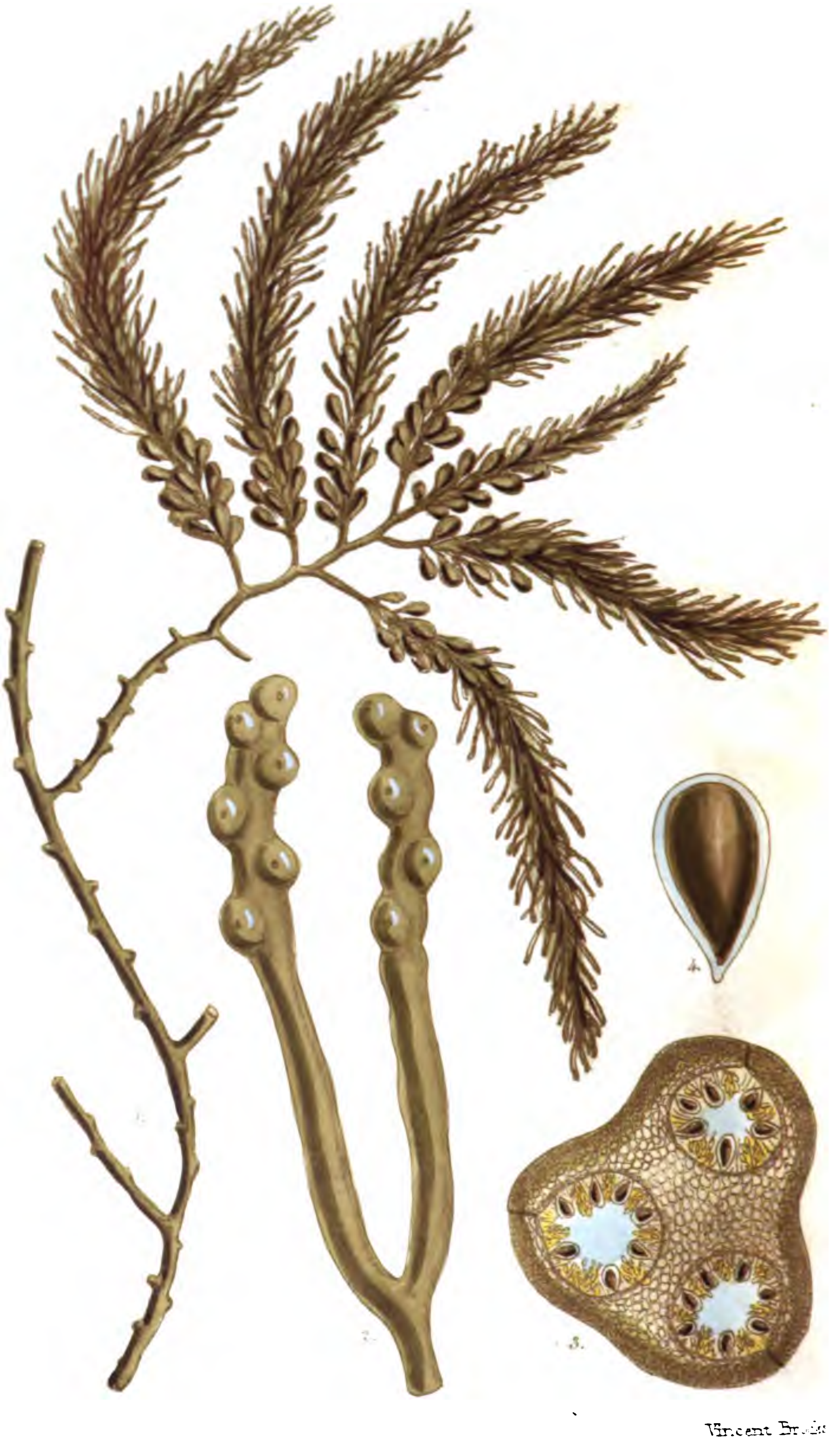
GEOGR. DISTR. West and south coasts of Australia.

DESCR. *Frond* 2–4 or more inches in breadth, very irregular in form, adhering by the whole of its lower surface to the object on which it grows, and spreading unequally, like a sponge, variously lobed, or tuberous; laxly filled with threads lying in a gelatinous slime, or at length hollow within. The surface is velvety, the pile formed of the tips of the vertically placed, peripheric ramuli of the component filaments. These ramuli vary much in shape; they are sometimes of nearly equal diameter throughout, and sometimes much attenuated at the base, and swollen at the extremity; at first they are filled with bright-green endochrome, but after the formation of the sporangia are empty and colourless. The *sporangia* occur on the sides of the peripheric ramuli; they are spindle-shaped, and filled with dark-green endochrome, which at length is transformed into zoospores. In *substance*, the frond is extremely soft and tender, soon decomposing in the air, or in fresh-water. It scarcely admits of being preserved by drying.

This plant, in summer-time, is profusely cast ashore at Princess Royal Harbour, K. G. S., and I have noticed it commonly on other parts of the south and west coast. It is almost impossible to preserve specimens on paper, as the great quantity of loose slime which the fronds contain rots the paper, and the plant itself either decays or loses its characters completely. The figure here given was prepared at King George's Sound, from freshly gathered specimens. It is much softer than other *Codia*, among which it perhaps comes nearest to *C. adhærens*, from which it differs in habit and substance. By roughly drying in the sun an unwashed frond, I contrived to preserve a specimen; but all that I had attempted to keep in paper rotted, and were thrown away.

Fig. 1. CODIUM SPONGIOSUM,—*the natural size*. 2. Section through a lobe of the frond. 3. Some of the peripheric ramuli. 4. Apex of a ramulus, with young *sporangia*. 5. A ramulus with ripe sporangia:—the latter figures variously *magnified*.

Plate LVI.



Vincent Brooks Imp.

PLATE LVI.

CYSTOPHORA BOTRYOCYSTIS, *Sond.*

GEN. CHAR. *Root* scutate. *Frond* pinnately decompound, dendroid, with distinct stem, branches, and ramuliform leaves. *Vesicles* stipitate, simple, rarely absent. *Receptacles* pod-like, torulose, or moniliform, developed in the ramuli. *Scaphidia* hermaphrodite. *Spores* obovoid. —CYSTOPHORA (*J. Ag.*), from *κυστις, a bladder,* and *φορεω, to bear.*

Radix scutata. Frons pinnatim decomposita, dendroidea, caule proprio, ramis foliisque ramuliformibus donata. Vesiculæ stipitatæ, simplices, raro deficientes. Receptacula siliquæformia torulosa v. nodulosa, apice ramulorum evoluta. Scaphidia hermaphrodita.

CYSTOPHORA *botryocystis;* stem subcompressed, pinnate or bipinnate; pinnæ issuing from the flat side of the stem, reflexed at base, simple or again pinnate; vesicles numerous, in a dense raceme at the base of the branches, ellipsoid or obovate, obtuse; ramuli filiform, simple or once forked, changing into torulose, terete receptacles.

C. botryocystis; *caule subcompresso pinnato v. bipinnato: pinnis e latere plano caulis egredientibus basi retroflexis, simplicibus pinnatisve; vesiculis pluribus ad basin ramorum dense racemosis ellipsoideis obtusis; ramulis filiformibus subsimplicibus in receptacula torulosa cylindracea abeuntibus.*

CYSTOPHORA botryocystis, *Sond. in Linn. v.* 25. *p.* 670. *Harv. Alg. Austr. Exsic. n.* 14.

HAB. Cast ashore from deep water. Holdfast Bay, *Dr. F. Mueller.* Brighton beach, Port Phillip, *W. H. H.*

GEOGR. DISTR. South coast of Australia, rare and local.

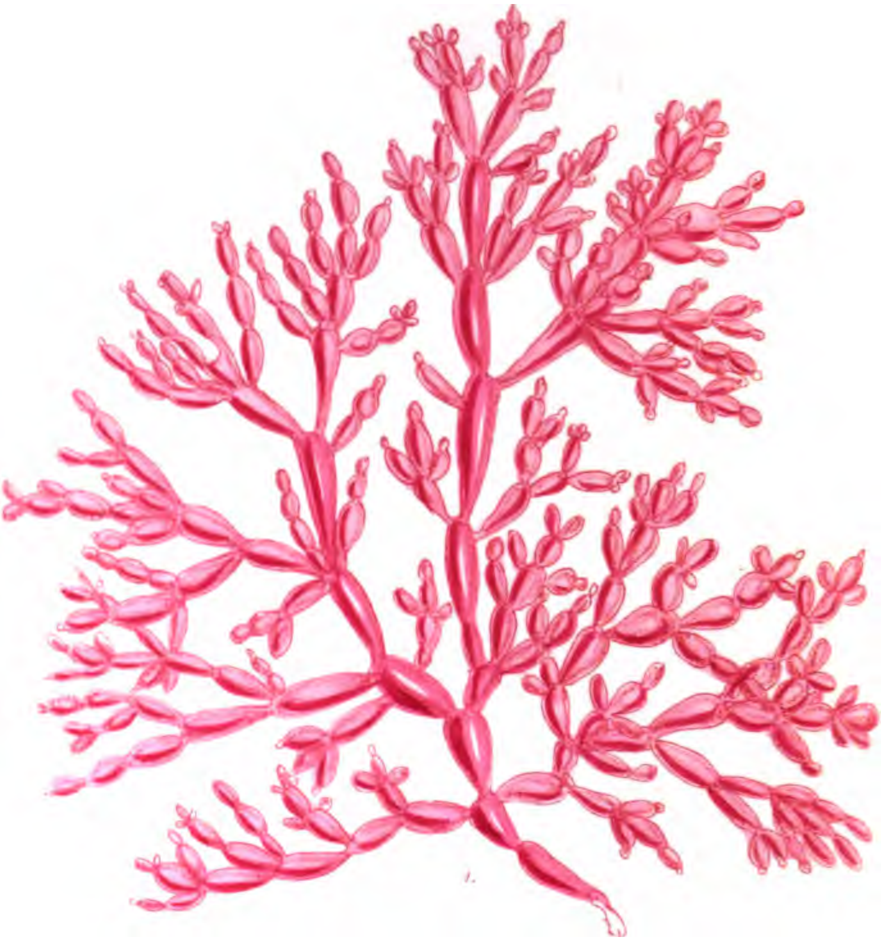
DESCR. *Root* discoid, an inch in diameter. *Fronds* several from the same base, 1–3 feet long, a line or two in diameter, flattened at the sides, or somewhat squared, once or twice pinnated. In full-grown specimens the lower part of the stem and of the larger branches is generally denuded, and distantly tuberculated with the bases of fallen branches. The branches issue from the flattened sides of the stem, and are inserted either horizontally, or are somewhat deflexed at their origin; the lower branches are pinnated, the upper simple. The *pinnæ* are three or four inches long, very patent, issuing from a flexuous rachis, their upper portion densely clothed with imbricated ramuli (leaves); their lower as densely set with numerous vesicles. Sometimes the whole pinna is nearly changed into a raceme of vesicles. The *ramuli* are ½–¾ inch long, simple or once forked, filiform or slightly clavate, and in fertile specimens are changed into torulose receptacles. The *vesicles* are egg-shaped, very obtuse, about two lines in length, borne on stalks shorter than themselves. The *receptacles* contain numerous spore-cavities, and the spores are broadly obovoid. The *colour*, when fresh, is an olive-brown; when dry, black. The *substance* is brittle.

The genus *Cystophora* is peculiar to the Australian coasts, and includes a considerable number of species, among the nobler forms of the Fucoids. It represents *Cystoseira* of the northern hemisphere, differing chiefly in the position of the vesicles; and is also allied to the cosmopolitan *Sargassum*, from which the position of the receptacles, and the filiform, ultimate segments or "*leaves*" distinguish it.

The species now figured was discovered by Dr. Mueller, and has been found in two distant localities of the southern coast. It is well distinguished from all previously known species by the very numerous egg-like vesicles, forming a sort of *raceme* at the base of the smaller branches. Our figure represents a lateral branch of a specimen three feet in length. The plant occurs commonly in Port Phillip.

Fig. 1. A branch and part of the stem of CYSTOPHORA BOTRYOCYSTIS,—*the natural size*. 2. A receptacle. 3. Cross-section of the same. 4. A spore:—the latter figures *magnified*.

Plate LIII.



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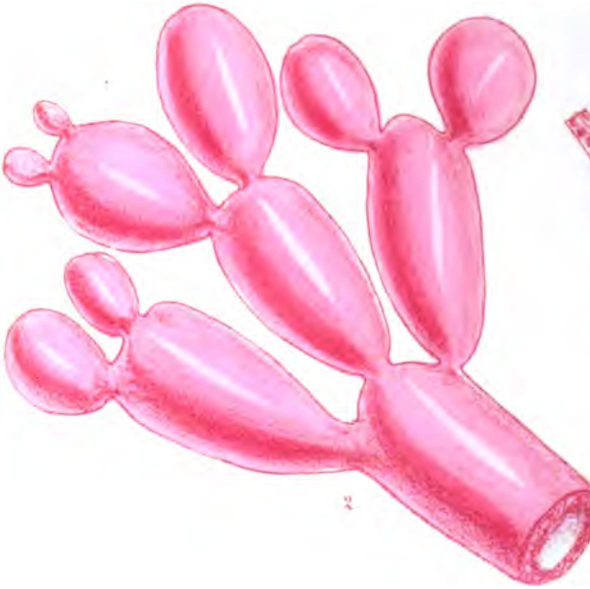

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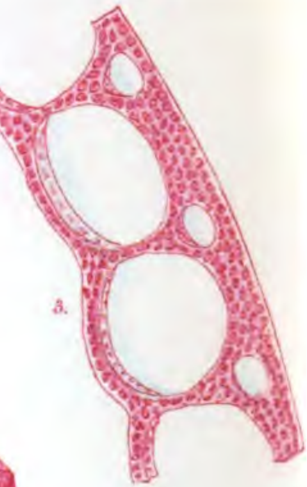


3.

Vincent Brooks lith.

PLATE LVII.

CHYLOCLADIA CLIFTONI, *Harv.*

GEN. CHAR. *Frond* terete or subcompressed, rarely nodoso-articulate, alternately decompound, tubular; periphery formed of angular cells. *Fructification:* 1, conical, external *conceptacles,* opening by a pore, containing a favelloid nucleus, surrounded by a web of filaments; 2, triangularly parted, scattered tetraspores.—CHYLOCLADIA (*Grev.*), from *χυλος, juice,* and *κλαδος, a branch;* the tube contains watery fluid.

Frons teres v. subcompressa, nunc nodoso-articulata, alterne decomposita, tubulosa; tubo succo aquoso repleto; strato peripherico ex cellulis rotundato-angulatis contexto. Fr.: 1, *cystocarpia simplicia, intra pericarpium externum conicum carpostomio demum apertum inclusa, reticulo arachnoideo cincta;* 2, *tetrasporæ triangule divisæ, sparsæ.*

CHYLOCLADIA *Cliftoni;* frond delicately membranous, rose-coloured, full of slimy gelatine, nodoso-articulate, trichotomous or umbellately branched; ramuli springing from nearly every node; lower internodes clavate, 4–5 times as long as broad; upper obovate; ultimate ellipsoidal, obtuse at both ends.

C. Cliftoni; *fronde tenui-membranacea succo gelatinoso repleta rosea e basi articulato-constricta trichotoma v. umbellatim ramosa; ramulis fere ad singula genicula egredientibus sæpe numerosis; articulis inferioribus clavatis diametro 4–5-plo longioribus, superioribus obovatis, ultimis ellipsoideis utrinque obtusis.*

CHYLOCLADIA Cliftoni, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 566.

HAB. Cast ashore at Fremantle, Western Australia, *G. Clifton, Esq.*

GEOGR. DISTR. As above.

DESCR. *Root* a disc, with clasping fibres. *Frond* 3–5 inches long, 1–2 lines in diameter, constricted as if jointed throughout, trichotomous or dichotomous, somewhat fastigiate; the upper branches frequently umbellate or crowded and fasciculate; all the axils very wide and obtuse. In some specimens the principal divisions are beset with crowded or fascicled ramuli, consisting of two or more articulations. The internodes or articulations of the larger divisions are clavate, and often 5–6 times as long as broad; those of the smaller branches are broader in proportion to their length; and the ultimate are scarcely twice as long as broad, and regularly ovoid. None are stipitate, the neck or node being generally half as wide as the internode. The *substance* is very thin and delicate, soon decomposing in fresh-water. When fresh, the tubular frond is full of slime, and in drying it adheres most closely to paper. The *colour* is a bright rosy-red. No *fruit* has been seen. The *periphery* is pierced with large lacunæ, with cellular walls; the *cells* small, angular, and coloured.

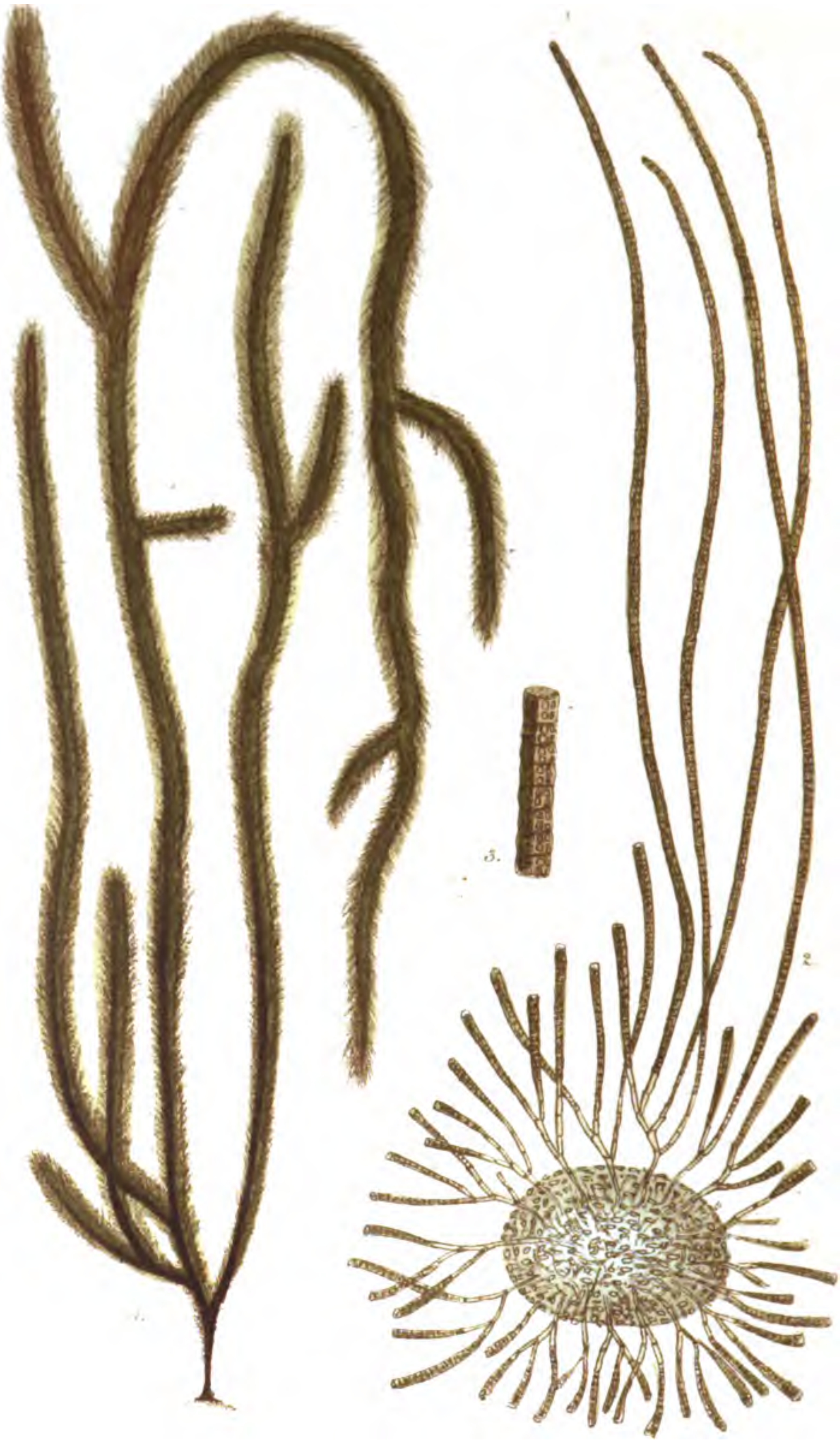
* * *

A rare and beautiful species, for a knowledge of which I am indebted to my excellent correspondent, whose name it bears, and who has repeatedly taken it, after storms, at Fremantle.

It is nearly related to *C. Muelleri*, Sond. (also found by Mr. Clifton), but is of a much brighter colour, a softer and more gelatinous substance, and, above all, differs in the wide "isthmuses" (so to say) between the articulations. In *C. Muelleri* the internodes are connected by very slender, setaceous pedicels. It may also be compared with very luxuriant specimens of the European *C. articulata*, from which also it differs in substance and colour, and in the shape of the internodes. It is possibly one of the plants to which the Australian "*Fucus articulatus*" of Brown, in Flind. App. p. 594, should be referred; but more probably that synonym attaches to *Chondria opuntioides*, a much more common plant, or to some species of *Erythroclonium*. All these Algæ have a similar external habit, though differing widely in structure and fructification.

Fig. 1. Chylocladia Cliftoni,—*the natural size*. 2. Apex of a branch, with young ramuli. 3. Portion of the periphery:—the latter figures more or less *magnified*.

Plate LVIII.



Vincent Brooks Imp.

PLATE LVIII.

MYRIOCLADIA SCIURUS, *Harv.*

GEN. CHAR. *Frond* cylindrical, branched, consisting of a tubular or solid axis formed of interwoven filaments, clothed externally with radiating, free, branched peripheric filaments. *Spores* obovate, borne on the radiating filaments.—MYRIOCLADIA (*J. Ag.*), from μυριος, *a thousand*, and κλαδος, *a branch.*

Frons cylindracea, ramosa; axi continuo tubuloso v. solido ex filis intertextis formato, filisque periphericis liberis ramosis radiantibus vestito; sporæ obovoideæ, in axilla filorum radiantium sessiles.

MYRIOCLADIA *Sciurus;* frond solid, subsimple or alternately branched; branches worm-like, attenuate at base, very long, simple; peripheric filaments elongate, branched at base, nearly cylindrical; articulations shorter than their breadth, slightly contracted at the joints.

M. Sciurus; *fronde solida subsimplici v. alterne ramosa; ramis vermiformibus longissimis simplicibus villosis basi attenuatis; filis periphericis elongatis basi ramosis vix moniliformibus; articulis diametro brevioribus ad genicula parum constrictis.*

MYRIOCLADIA Sciurus, *Harv. Alg. Austr. Exsic. n.* 90.

HAB. On stones, near low-water mark. At Port Fairy, Victoria, and at Newcastle, New South Wales, *W. H. H.*

GEOGR. DISTR. South and east coasts of Australia.

DESCR. *Root* a conical disc. *Frond* 1–2 feet long, two lines in diameter, at first simple, afterwards emitting alternate or irregularly scattered branches, similar to the primary frond, and always quite simple. The *branches* frequently issue only near the base of the main trunk, and are 12–14 inches long, and generally bare of ramuli; but in old specimens a few ramuli are sometimes given off. Every portion of the frond is thickly clothed with long, free, villous, hair-like *filaments;* these are branched at base, the branches simple and thread-like, coloured, and articulated; the *articulations* somewhat contracted at the septa, and shorter than their diameter. No *fruit* has been seen. The *substance* of the axis is firmly gelatinous or somewhat cartilaginous, very elastic and slippery, and in drying the plant adheres most closely to paper. The *colour* is a dark-olive, with a fulvous hue in the peripheric filaments.

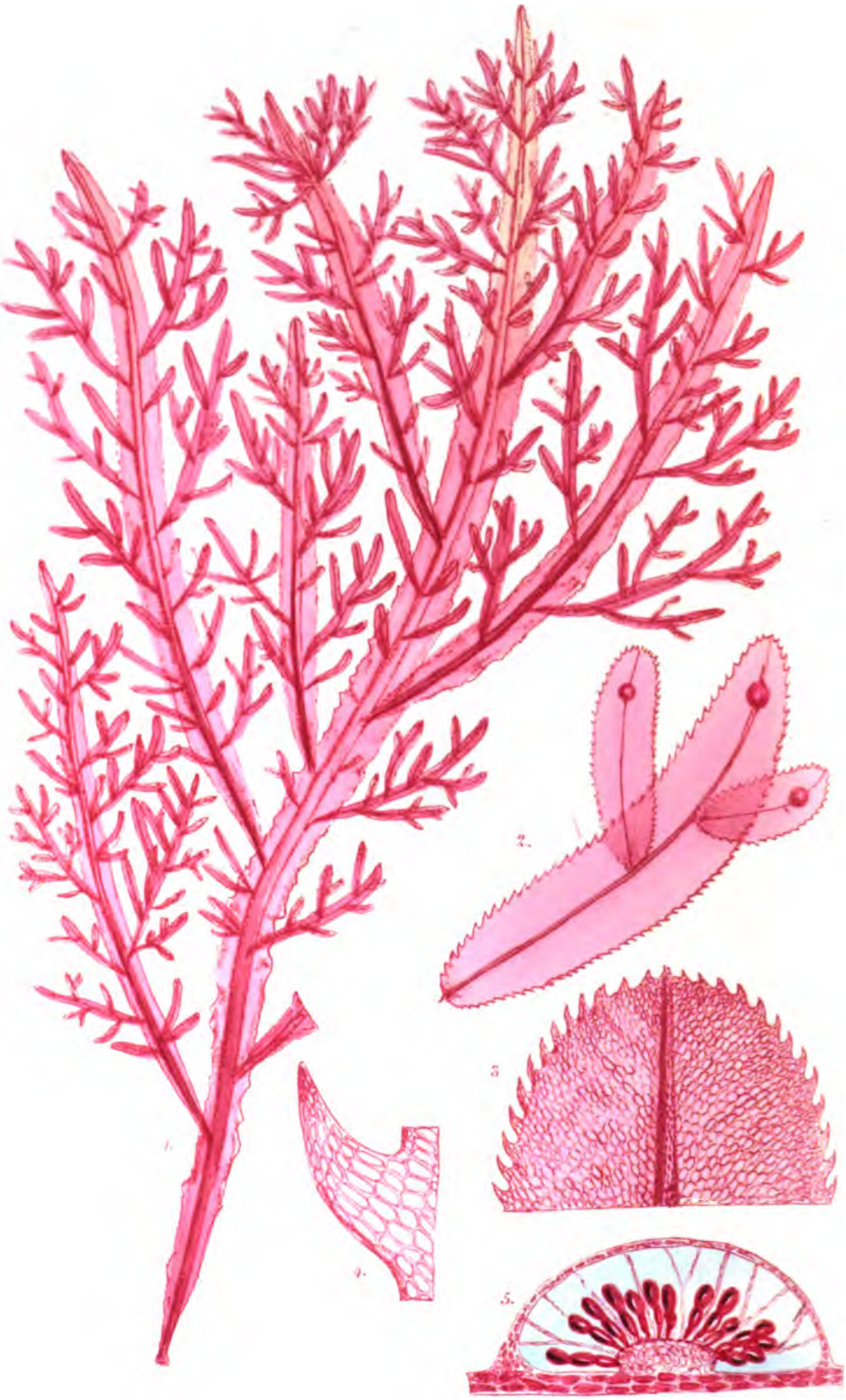
The figure here given represents a young and comparatively unbranched specimen of this (for the genus) handsome species. Older specimens frequently are pinnated with closely-set, long branches. The branches are usually quite simple, resembling the bushy tail of some animal, but the likeness to a squirrel's tail, indicated by the specific name, refers rather to the copious villosity than to the shape.

In the locality at Port Fairy I found it in considerable abundance in the month of October. Most probably it is an annual of rapid growth.

Whether Agardh will acknowledge it as a species of his *Myriocladia* remains to be seen. I have not been able to determine exactly, from the dried specimen, the structure of the axis. In habit there is much resemblance to *M. capensis,* J. Ag., but the structure is certainly different.

Fig. 1. MYRIOCLADIA SCIURUS,—*the natural size.* 2. Cross section of the *axis* and some of the peripheric filaments, most of them cut off short. 3. Portion of a filament:—the latter figures variously *magnified.*

Plate LIX.



Vincent Brooks Imp

Plate LIX.

DELESSERIA SERRULATA, *Harv.*

Gen. Char. *Frond* leaf-like, membranaceous, areolated, symmetrical, simple or branched, midribbed. *Fructification:* 1, hemispherical *conceptacles,* sessile on the midrib, or on a lateral nerve, containing a tuft of moniliform spore-threads on a basal placenta; 2, tripartite *tetraspores,* in definite *sori* or spots, on the frond, or on accessory leaflets.—Delesseria (*Ag.*), in honour of Baron Delessert, a distinguished patron of botany.

Frons foliacea, membranacea, areolata, symmetrica, simplex v. ramosa, costata. Fr.: 1, coccidia in costa venisque frondis sessilia, hemispherica, fila sporifera moniliformia a placenta basali emissa foventia; 2, tetrasporæ triangule divisæ, in soros definitos collectæ.

Delesseria *serrulata;* frond linear-lanceolate, repeatedly proliferous from the thick midrib with leaflets of a similar form; leaflets sharply serrulate; conceptacles on the midrib of the younger leaflets, near the apex; sori on each side of the midrib.

D. serrulata; *fronde lineari-lanceolata repetite prolifera; foliolis a costa crassissima vage prorumpentibus argute serratis; coccidiis in costa foliolorum sub apice sessilibus, sorisque elongatis utroque latere costæ subsingulis.*

Delesseria serrulata, *Harv. Alg. Austr. Exsic. n.* 277. *Harv. in Perry's Exp. to Japan, Bot. Appendix, p.* 331.

Hab. Dredged in Port Jackson, New South Wales, *Charles Moore, Esq.*

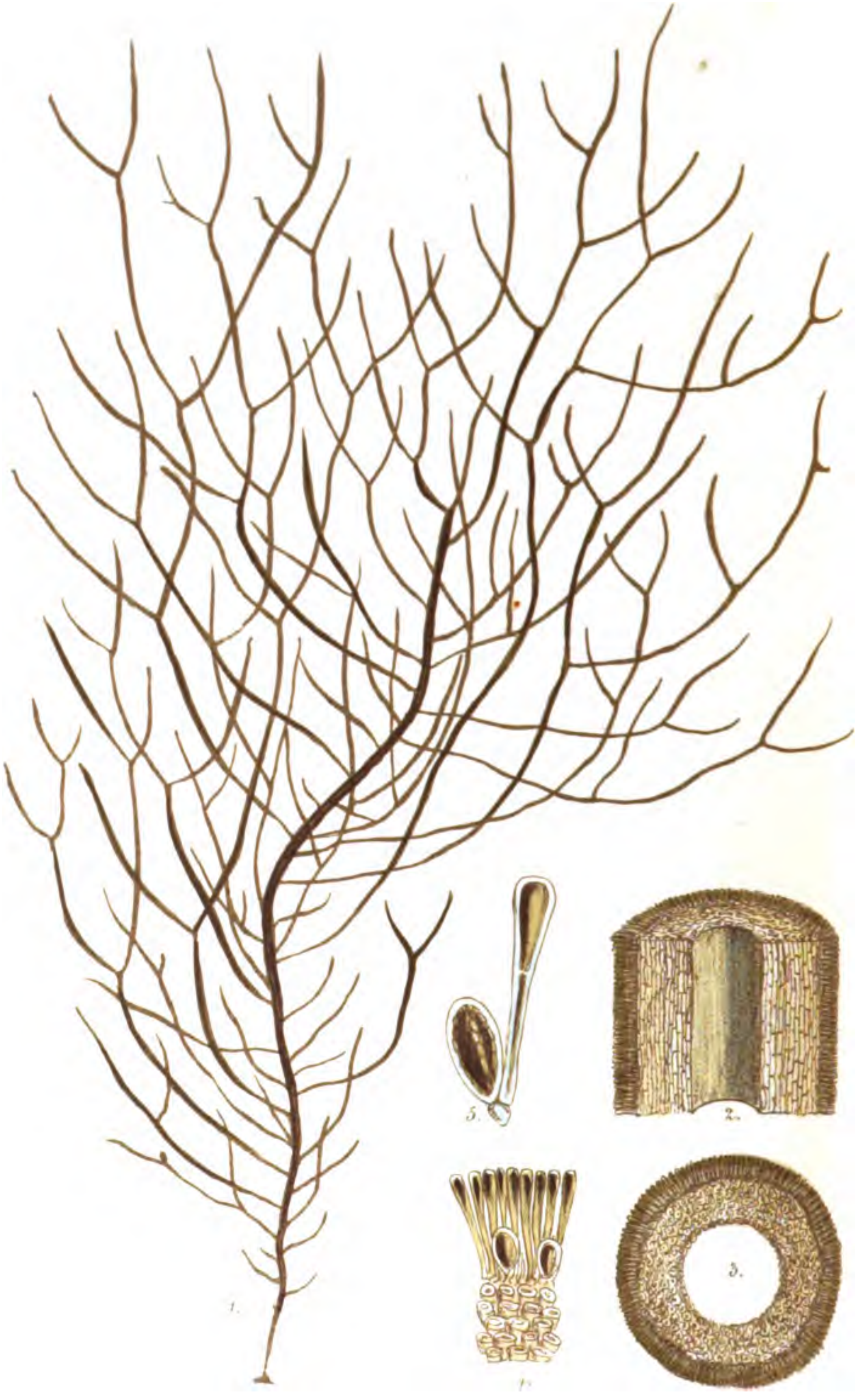
Geogr. Distr. East coast of Australia. Japan, *Dr. Morrow.*

Descr. *Root* a conical disc. *Frond* 6–12 inches long (or more), linear-lanceolate, undivided, from ¼–½ inch in breadth, tapering to each end, and traversed by a broad, incrassated midrib, which is sometimes one-third the breadth of the frond, sometimes narrower. This *primary* frond emits irregularly from its midrib numerous secondary fronds of similar shape, but smaller; and these, in like manner, emit a third and fourth series of leaflets, until the general frond becomes much branched and bushy. In very old specimens the main frond is gradually denuded of membrane and changed into a stem. All the leaflets are linear-lanceolate, but they vary in degree of attenuation, and in the acute or obtuse apex. The margin is invariably sharply serrulate, a character only visible under the microscope. *Coccidia* hemispherical, near the apices of the youngest leaflets. *Sori* not yet found on Australian specimens. The *colour* is a bright rosy-red. The *substance* is soft, flaccid, and delicately membranaceous, and the frond closely adheres to paper in drying.

This well-marked and handsome species was discovered in Sydney harbour by Mr. Charles Moore, from whom I received the only Australian specimens I have seen of it. But much more copious specimens have been sent to me by an American explorer, Dr. Morrow, who collected them at Hakodadi, Japan. On comparing individuals from both habitats, the chief differences observable are, that the colour in the Japan plants is duller and more purple, and the fronds and leaflets more acuminate; but in substance, serrated margin, and cellular structure, they so well agree with the Australian, that I do not think it advisable to separate them specifically: particularly as the allied species, *D. Hypoglossum* and *D. crassinervia,* vary in a similar manner. As yet very few specimens have been found at Port Jackson, and probably, had we a larger series for comparison, the identity with the Japan plant would be more absolute.

From all closely allied species this is known by its sharply serrate margin: from the narrower forms of *D. frondosa* by the very broad and strong midrib.

Fig. 1. DELESSERIA SERRULATA,—*the natural size.* 2. Leaflets with conceptacles. 3. Apex of a leaflet, to show the cellular structure. 4. One of the serratures of the same. 5. A vertical section of a conceptacle:—the latter figures variously *magnified.*



Vincent Brooks Imp.

PLATE LX.

CLADOSIPHON CHORDARIA, *Harv.*

GEN. CHAR. *Frond* cylindrical, branched, consisting of a tubular axis, formed of longitudinal, anastomosing filaments, clothed externally with radiating, subsimple, densely crowded peripheric filaments, invested with gelatine. *Spores* obovoid, at the base of the radiating filaments.—CLADOSIPHON (*Kütz.*), from *κλαδος, a branch,* and *σιφων, a tube.*

Frons cylindracea, ramosa; axi tubuloso ex filis longitudinalibus anastomosantibus formato, filisque periphericis muco involutis subsimplicibus radiantibus densissime vestito. Sporæ obovoideæ, ad basin filorum radiantium sessiles.

CLADOSIPHON *Chordaria;* stem undivided, percurrent; branches lateral, elongate, directed toward all sides, simple or subdichotomous; ramuli few; axils obtuse; peripheric filaments simple, very short, clavate, unicellular; spores elliptical.

C. Chordaria; ***caule indiviso percurrente; ramis lateralibus longissimis quoquoversis simplicibus v. subdichotomis; ramulis paucis; axillis obtusis; filis periphericis simplicibus brevissimis clavatis unicellularibus; sporis ellipticis.***

CLADOSIPHON Chordaria, *Harv. Alg. Exsic. Austr. t.* 95, 96. *Harv. in Hook. fil. Fl. Tasm. ined.*

Var. β. *Dictyosiphon;* frond smaller, more densely branched, the branches beset with short ramuli.

Var. β. Dictyosiphon; ***fronde minori densius ramosa, ramis ramulis plus minus obsitis.***

CLADOSIPHON Dictyosiphon, *Harv. Alg. Exsic. Austr. t.* 97.

HAB. On rocks, near low-water mark. Brighton, Port Phillip, and Georgetown, Tasmania.—Var. β. At Port Fairy, *W. H. H., etc.*

GEOGR. DISTR. South coast of Australia. North coast of Tasmania.

DESCR. *Root* a small, conical disc. *Fronds* generally tufted, 6–12 inches long or more, from ½–1 line or more in diameter, cylindrical. *Stem* undivided, often flexuous, and sometimes remarkably zigzag and spirally contorted, more or less densely beset with branches throughout. *Branches* lateral, scattered irregularly, directed toward all sides, flexuous like the stem, either quite simple or twice or thrice forked at long intervals, often bare of ramuli, but in var. β beset with short, horizontally patent, filiform branchlets. The branches and their lesser divisions taper to each end, a character chiefly observable in the more robust specimens, but traceable in all. The *axils* are invariably wide and very obtuse; the *apices* acute. The *frond* is hollow, the tube being more than one-third the diameter; the axile cylinder is

formed of very densely compacted and agglutinated longitudinal filaments, exactly as in *Chordaria*, and the peripheric ramelli form a very thin, velvety pile on the surface, and are also of the character of those of a *Chordaria*. The *spores* are obovoid, and abundantly produced. The *substance* is softly membranous, and somewhat gelatinous, and the plant adheres closely to paper in drying. The *colour* is a dark brown.

Except in having a hollow and tubular instead of a solid axis, the plant here figured does not differ from *Chordaria*, and probably it would be better to retain it as a species of that genus. In different localities it varies much both in size, diameter, and ramification; and I had at first sorted and distributed the specimens under three supposed species. On more closely examining with the microscope, I find the structure so similar in all, and the ramification and size so variable, when traced through a long suite of specimens, that I am forced to unite n. 95, 96, 97, of my Alg. Exsic. under the present species. It ranges over a considerable length of coast. The specimens from Georgetown, Tasmania, are very much larger and more robust than our figure, taken from a Port Phillip specimen. The deep estuary of the Tamar seems peculiarly favourable to the growth of all Algæ, as is well known to Tasmanian collectors.

Fig. 1. CLADOSIPHON CHORDARIA,—*the natural size*. 2. Longitudinal semisection of a branch. 3. Transverse section of the same. 4. Small portion of the periphery, with spores *in situ*. 5. A peripheric filament and spore at its base :—the latter figures variously *magnified*.